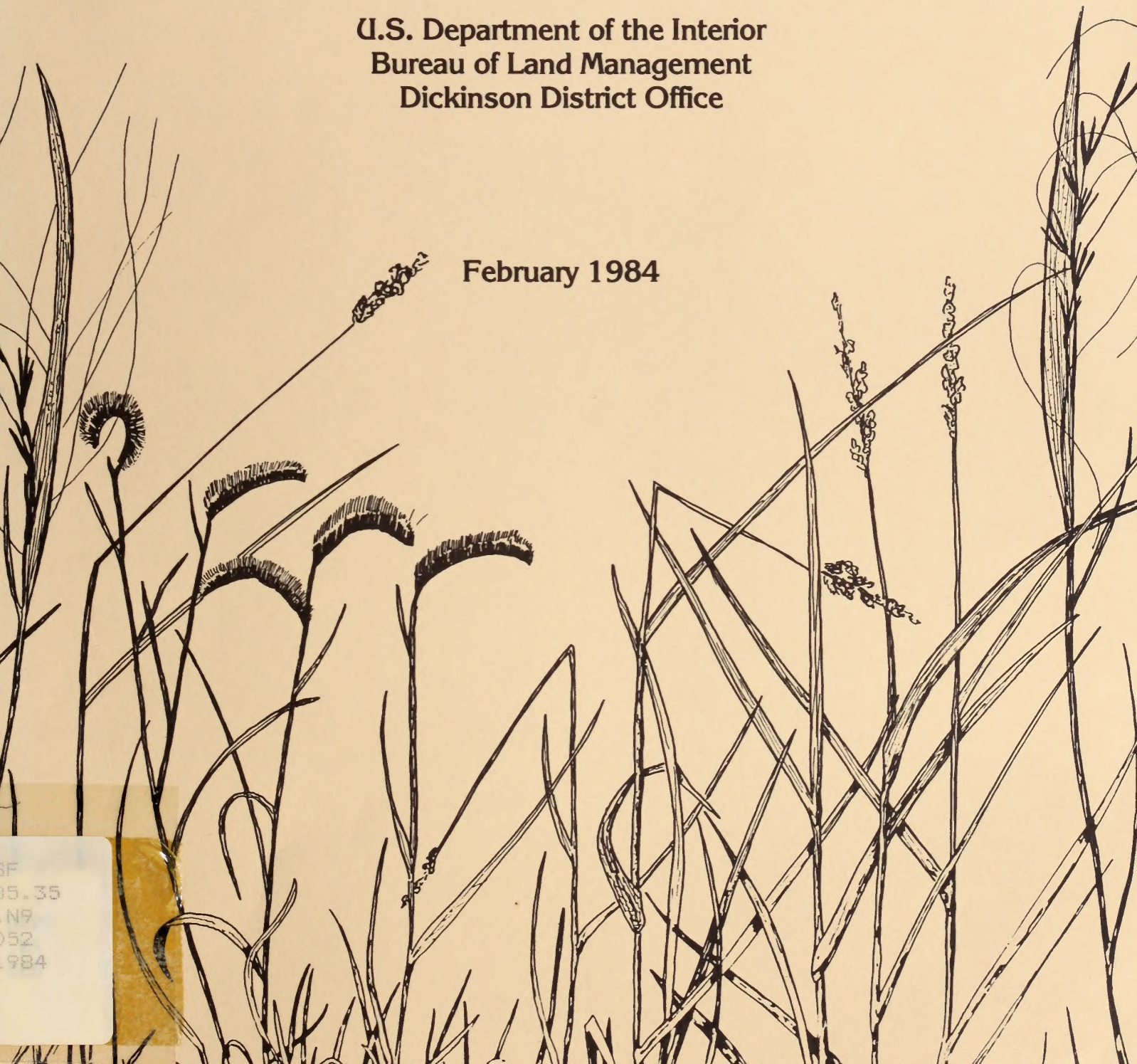
DRAFT

NORTH DAKOTA GRAZING ENVIRONMENTAL IMPACT STATEMENT

U.S. Department of the Interior
Bureau of Land Management
Dickinson District Office



February 1984

BLM-MT-ES-84-005-4322

IN REPLY REFER TO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Dickinson District Office
P.O. Box 1229
Dickinson, ND 58602

Dear Reader:

This draft Environmental Impact Statement (EIS) is presented for your review and comments. This document outlines four major alternatives for managing grazing on public land administered by the Bureau of Land Management in North Dakota. These alternatives are designed to resolve grazing management issues on public lands.

We would appreciate your comments on this EIS by April 13, 1984. Questions or comments should be directed to Raymond C. Altop, Project Manager, Dickinson District Office, BLM, P.O. Box 1229, Dickinson, North Dakota 58602. We also invite you to visit our office at 204 Sims Street, Dickinson.

All comments, written or oral, will be given equal consideration in the preparation of the final Environmental Impact Statement. I hope that through your participation in this effort, we can move together toward a common goal of improved grazing management on public land in North Dakota.

Sincerely yours,

Michael J. Penfold

Michael J. Penfold
State Director

DRAFT

NORTH DAKOTA GRAZING ENVIRONMENTAL IMPACT STATEMENT

For The

DICKINSON DISTRICT, NORTH DAKOTA

Prepared By

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

February 1984

United States Department of the Interior
Bureau of Land Management
Dickinson District

NORTH DAKOTA GRAZING ENVIRONMENTAL IMPACT STATEMENT

This draft environmental impact statement (EIS) addresses future grazing management options for approximately 68,000 surface acres of public land administered by the Bureau of Land Management (BLM) through its Dickinson District Office in Dickinson, North Dakota. This EIS responds to litigation in Natural Resources Defense Council et al versus Rogers C.B. Morton et al, 1973 (U.S. District Court for the District of Columbia, ref. Case No. 1983-73).

Four alternative courses of action are considered in detail in this document. Alternative A, the preferred alternative, strikes a balance between livestock use and enhanced environmental protection. Alternative B is a continuation of present management practices. Alternative C assumes reduced livestock grazing, and Alternative D assumes no livestock grazing.

After reviewing public comments on this EIS, the BLM Dickinson District will make a final decision on the course of action to follow. This decision will be published and distributed to the persons on the mailing list for the present document. For further information, contact Raymond C. Altop, Project Manager, Dickinson District Office, P.O. Box 1229, 204 Sims Street, Dickinson, ND 58602; telephone (701)225-9148.

JANUARY 1984

SUMMARY

The North Dakota Grazing Environmental Impact Statement (EIS) involves the Bureau of Land Management's Dickinson District, encompassing 31 counties of North Dakota. The study area comprises approximately 29.5 million acres of which about 68,000 acres (0.2%) are administered by the Bureau of Land Management (BLM).

Soil and vegetation inventories, water resource surveys, social and economic surveys and other resource inventories were begun in 1979 and completed in 1983. Throughout the entire planning process and EIS preparation, information and concerns were solicited from ranchers, public land use groups, conservation organizations, special interest groups, service organizations, conservation districts, local universities, and private citizens. Further information was obtained through close coordination with other land and resource management agencies or individuals, including the Forest Service and the Soil Conservation Service, U.S. Department of Agriculture, U.S. Fish and Wildlife Service, North Dakota Game and Fish Department, county planning boards and private landowners.

Public participation in BLM's planning process was solicited through questionnaires mailed to each lessee, mailing of more than 240 brochures to livestock operators using BLM lands, interested groups and individuals, and agencies. These brochures presented potential alternatives to be addressed and solicited comments. In addition, open house and informational sessions were held in Bowman, Mott, Watford City and Williston, North Dakota, July 25-28, 1983, to solicit comments and responses from the public. Three written comments were received as a result of the brochure and meetings.

Based on resource inventories, issues raised by the public and procedural requirements, four alternative courses of action were developed. Alternative A, "Rangeland Improvement" was selected as the preferred alternative because of the resource benefits, cost and public comment. After reviewing the draft EIS, decision-makers will select the final rangeland management program to be implemented on public lands in the North Dakota Grazing EIS area. This management program may be the preferred alternative or it may incorporate parts of all alternatives.

Of the 68,000 acres of public lands managed by the BLM in the EIS area, 3,995 acres are in fair ecological range condition, 47,186 acres are in good to excellent ecological range condition, and 16,819 acres are unclassified as to condition, 3,000 of which are suitable for grazing, the remainder being unsuitable for grazing.

In this draft EIS, the four alternatives from which the final grazing management program will be selected as titled: (A) Rangeland Improvement, (B) No Action, (C) Reduced Livestock Use, (D) No Grazing.

These alternatives were developed from information and recommendations in the Golden Valley, West-Central, McKenzie-Williams and Southwest Management Framework Plans (MFPs).

Proposals in Alternative A and C would reduce the amount of range in fair ecological range condition. Alternative B would keep the situation as it is, and Alternative D would eliminate grazing.

Initial livestock animal unit months (AUMs) would remain the same in Alternatives A and B, decrease by 20% in Alternative C and decrease to zero in Alternative D. In the long term (15 years after implementation), Alternative D would result in no livestock AUMs; Alternative B would not change livestock AUMs and Alternatives A and C would increase the livestock AUMs above the short term projections. The preferred alternative would increase livestock forage by 15% over the existing AUMs because of implementation of mechanical and grazing treatments, the development of range facilities and leasing previously unleased lands.

Both the public and BLM are concerned with maintaining adequate wildlife habitat while maintaining a balance between livestock and wildlife use.

Protecting soil by reducing erosion is another major concern of both the public and BLM resource specialists. Increasing vegetation cover through mechanical or grazing treatments would improve the capacity of the soil to absorb the water necessary for vegetation production. Increased absorption of moisture into the soil reduces runoff, erosion and maintains soil productivity. High levels of vegetation production would increase the amount of forage for both livestock and wildlife use.

A summary of the environmental consequences for each of the four alternatives follows.

ALTERNATIVE A: RANGELAND IMPROVEMENT

As the preferred alternative, this proposes revision while continuing operation of the three existing AMPs on 20,403 acres of public lands administered by BLM, continued permitted grazing on 94 allotments encompassing 53,420 acres, leasing 3,000 additional acres suitable for grazing, and leaving 11,580 acres unleased for grazing.

Watershed conditions would improve in the long term, with a reduction of sediment and water yields by approximately 10% and 5%, respectively.

Ecological range condition would be maintained or improved to good to excellent condition on most lands. Total vegetation production would increase approximately 6½% in the long term.

Total increase in net annual income to all affected ranch operations would be $5,400 in the long term. The long term increase in livestock sales would be $11,000.

Wildlife habitat would improve with special consideration given to protect crucial wildlife habitat and wintering areas.

Improved watershed and ecological range conditions would reduce the natural destruction of some cultural resource sites by erosion. Long term loss of scientific data could occur if sites were destroyed by ground disturbances resulting from implementation of range projects and land treatments. However, most range improvements would be located to avoid cultural sites.

Implementation cost of this alternative would be $160,000.

ALTERNATIVE B: NO ACTION — CONTINUE PRESENT MANAGEMENT

This alternative would freeze the current range program as it is today. Livestock stocking rates would remain the same, regardless of range condition or trend. AMPs in effect would continue, but no new range improvements would be developed. Maintenance of current improvements would be allowed. In the short term, the general range condition and trend would continue. In the long term, they would remain static or decline due to lack of adequate monitoring and supervision and spread of noxious weeds.

Watershed conditions would deteriorate in the long term. In the short term, there would be little discernable change.

Wildlife habitats would continue as they are currently trending. Without the capabilities to manage livestock use, livestock concentrations would cause local deterioration of habitats. No additional residual cover would be available for upland game, waterfowl and other species.

There would be no implementation cost for this alternative as maintenance would be the responsibility of the operator.

ALTERNATIVE C: REDUCED LIVESTOCK USE

This alternative proposes continuing the three existing AMPs, continue permitted grazing on 94 allotments and leasing 3,000 unleased acres for grazing. Target AUM figures would be 20% of the total vegetation to livestock and 80% to wildlife and nonconsumptive uses.

Watershed condition would improve in the long term with a reduction in sediment and water yields by approximately 12% and 6%, respectively.

Range conditions would be maintained or improved to good or excellent condition on most lands. Vegetation condition would improve in riparian areas, around reservoirs and on erosion-susceptible areas. Livestock AUMs would be reduced by 1,951 AUMs in the short term due to vegetation use target levels being reduced from 25% to 20% of the total production. In the long term, there would be a 15% increase in AUMs to livestock beyond the short term projections.

Wildlife habitat would improve for big game, upland game and waterfowl as would nongame habitat.

Total short-term decreases in net annual income to all affected ranch operations would be $17,200. Total long-term decreases in net annual income to all affected ranch operations would be $11,250.

Total implementation cost of this alternative would be $192,000.

ALTERNATIVE D: NO GRAZING

This alternative would eliminate livestock grazing on public land administered by the BLM, affecting 97 allotments. No range improvements would be built or maintained unless the improvements were considered necessary for watershed or wildlife resources.

Watershed improvement would be relatively small. Sediment yields would be reduced about 5% and water yields by an insignificant amount.

Ecological range condition would initially show improvement then stabilize and show some decline due to lack of grazing stimulous necessary for vegetative production.

Wildlife habitat would improve initially, but would trend toward climax or decadent conditions which is less desirable habitat.

The 3 operations with AMP allotments would be severely affected due to the loss of all BLM AUMs. The attitudes of affected ranchers would probably be extremely negative toward BLM and the plan. Total short and long-term decreases in net annual income to all affected ranchers would be $85,000. The annual loss in livestock sales would be $165,000 and gross business value would decrease by $744,900 annually. In the long term, these changes would be insignificant to the regional economy.

Total implementation of this alternative would be $1,495,000 (the cost to fence off public land with approximately 650 miles of fence).

CONTENTS

CHAPTER 1
PURPOSE AND NEED

INTRODUCTION

The North Dakota Grazing Environmental Impact Statement (EIS) analyzes the natural resource, social, and economic impacts of implementing a rangeland management program on surface lands managed by the Bureau of Land Management (BLM) in North Dakota.

The BLM is responsible for the management of livestock grazing on public lands in a manner that maintains or improves the public land resources including soil, water, vegetation, and wildlife habitat. The Bureau's principal authority to manage livestock grazing on public lands is found in the Taylor Grazing Act of 1934, Federal Land Policy and Management Act of 1976, and the Public Rangelands Improvement Act of 1978.

BASIS

This EIS is written in compliance with the National Environmental Policy Act of 1969, Council on Environmental Quality regulations, and in specific response to litigation in Natural Resources Defense Council et al. versus Rogers C.B. Morton et al., 1973 (U.S. District Court for the District of Columbia, ref. Case No. 1983-73).

SETTING

The coverage area for the North Dakota Grazing EIS consists of all 68,000 acres of public land administered by the BLM in North Dakota. These lands are located in 31 counties (see Table 1-1).

TABLE 1-1

COUNTIES IN EIS AREA

County	Estimated Total Acres	Estimated BLM Acres	% BLM of County Total
Bowman	748,000	32,808	4.4
Dunn	1,331,000	15,989	1.2
McHenry	1,218,000	3,233	0.3
Golden Valley	648,000	2,358	0.4
McKenzie	1,819,000	1,629	0.1
Divide	837,000	1,605	0.2
Kidder	915,200	1,520	0.17
Williams	1,367,000	1,401	0.1
Mountrail	1,229,000	1,037	0.1
Burleigh	1,071,900	860	0.08
Billings	728,600	680	0.09
Grant	1,069,600	604	0.06
Emmons	997,760	599	0.06
McLean	1,489,600	599	0.04
Logan	649,600	523	0.08
Mercer	710,500	459	0.06
Sheridan	643,400	378	0.06
Ward	1,316,000	266	0.02
McIntosh	638,080	213	0.03
Morton	1,244,000	199	0.02
Cavalier	968,320	160	0.02
Pierce	693,120	126	0.02
Oliver	467,100	112	0.02
Stutsman	1,470,080	80	0.01
Adams	633,200	80	0.01
Renville	568,100	78	0.01
Eddy	412,800	54	0.01
Benson	914,560	49	0.01
Grand Forks	920,320	40	0.004
Walsh	825,600	11	0.001
Barnes	956,800	5	0.001

The EIS addresses the use of vegetation on BLM public lands, potential impacts which can be anticipated from livestock grazing, plus all reasonable alternatives which surfaced during the preparation of the EIS. Map 1-1 shows the EIS coverage area and approximate public land acreage in each county.

There are approximately 29.5 million acres in the 31-county EIS area, including approximately 68,000 acres of public lands under BLM management. About one-half (32,808 acres) of these public lands are concentrated in Bowman and Dunn counties. BLM lands contribute about .2% to the total acreage in the EIS area.

The EIS area includes 53,420 acres of BLM lands that are leased for grazing in 97 different allotments (see Table 1-2) to 94 operators. These lands are administered by the Dickinson District Office. The most consolidated block of BLM lands (20,503 acres) is located in western Bowman County, where three allotment management plans (AMPs) were developed in the late 1960s. This block of lands is known as the Big Gumbo Management Area. The AMPs have been placed in the maintenance (M) category for management purposes, the remaining 94 non-AMP allotments have been placed in the custodial (C) category for management purposes.

While there are a few large contiguous tracts of BLM public land, the primary land ownership pattern consists of small isolated tracts of public lands intermingled with private and state lands. These land patterns strongly affect grazing management options. Public lands are usually rough uplands with low productivity or are mostly submerged wetlands. In addition to livestock grazing, public lands provide wildlife habitat, recreation, and other activities compatible with multiple-use management.

MANAGEMENT GUIDELINES AND RESOURCE CONDITION

The EIS area contains significant amounts of private lands as well as lands managed by the North Dakota State Land Department, North Dakota Game and Fish Department, the U.S. Fish and Wildlife Service, U.S. Forest Service, and U.S. Army Corps of Engineers. The management of BLM lands is influenced by this varied ownership. (See Table 1-3.)

Development of the proposed rangeland management program is guided by mandates to manage the public lands for multiple use and sustained yield under the Federal Land Policy and Management Act (FLPMA) of 1976. This act requires land use plans based on interdisciplinary resource inventories contained in the Unit Resource Analysis (URA) and social and economic data analyzed in the Planning Area Analysis (PAA).

TABLE 1-2

GRAZING LEASE INFORMATION

County	Acres Leased	AUMs	Number of Operators
WEST RIVER			
Adams	40	10	1
Billings	640	183	1
Bowman	32,688	5,676	35
Dunn	14,648	2,371	15
Golden Valley	2,318	524	6
McKenzie	190	49	4
Morton	114	35	4
Grant	80	30	1
Total	50,718	8,878	67
EAST RIVER			
Divide	40	10	1
Eddy	40	16	1
Emmons	58	24	2
Kidder	40	10	1
McHenry	1,668	559	11
Mountrail	336	107	8
Pierce	40	13	1
Sheridan	40	13	1
Williams	440	121	4
Total	2,702	873	30
State Total	53,420	9,751	97

TABLE 1-3

RANGE LAND OWNERSHIP IN EIS AREA

	Acres	Percent
BLM		
Leased	53,420	
Unleased (estimated)	3,000	
Other land and water	11,580	
Total	68,000	.5
USFS	1,105,576	8.4
USF&WS Rangeland portion	93,275	.7
Corps of Engineers (Lake Sakakawea)	43,281	.3
Park Service	71,023	.5
State School lands	722,941	5.5
Private Range	11,000,000	84.6
Total	13,104,096	100

Management decisions are then developed in the Management Framework Plan (MFP) or, in the future, the Resource Management Plan (RMP). MFP recommendations or proposed MFP decisions provide a basis for some management alternatives of this EIS.

The EIS area includes the Golden Valley, West-Central, McKenzie-Williams, and Southwest MFP planning areas, for which MFPs have been completed. These planning documents are available at the Dickinson District Office. The remainder of the state is not covered by land use plans. Some revisions of the MFPs may be required, depending on EIS results.

Following the EIS, development plans and/or activity plans will be prepared. These plans will be geared to address specific management objectives. In addition to allotment management plans (AMPs), they may take the form of habitat management plans (HMPs), watershed management plans (WMPs), or cooperative management agreements with grazing lessees and other agencies such as the Soil Conservation Service or the North Dakota Game and Fish Department. Due to factors such as small size, scattered nature, and the low percentage of BLM range within individual ranch operations, no new AMPs are anticipated at this time. The analysis developed in the EIS will help guide development of these plans and future management. The full range of resource data will also then be available to help select the proper grazing systems, treatments, range improvements, and grazing adjustments to implement the individual activity plans. All projects and improvements will be subjected to benefit/cost analysis before implementation.

MONITORING AND EVALUATION

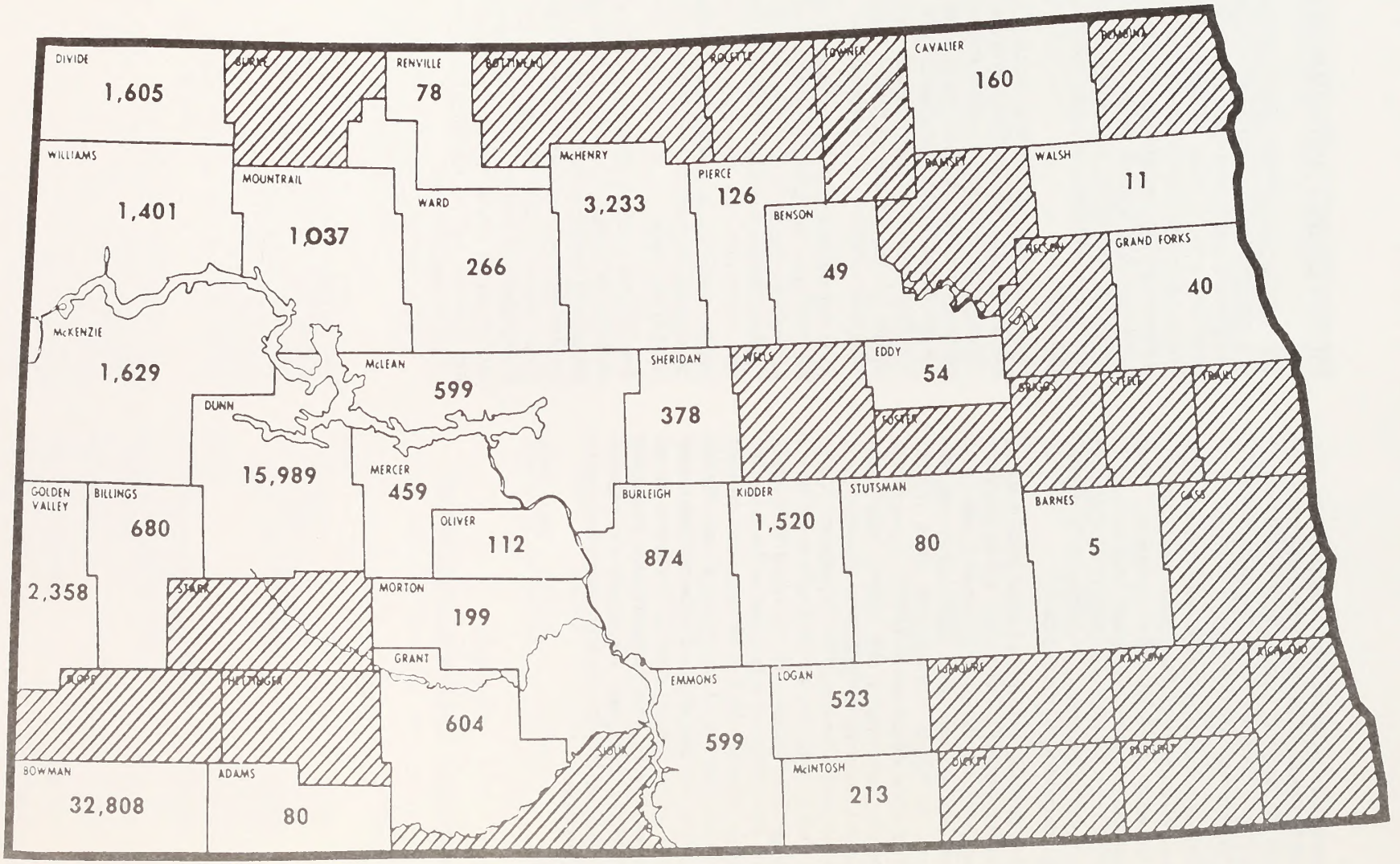
The key to success of grazing management is a system of monitoring and evaluation which ensures that stated objectives are being met. Each allotment has different potentials, opportunities, problems, and objectives. The activity plans may involve various levels of management intensity, including, on allotments under custodial care, the documentation of present management. The monitoring and evaluation plan must be flexible, cost effective, and tailored to the needs of the allotments.

Typical monitoring activities include regular visits (preferably with the ranch operator) to observe how the system is operating and to resolve any problems. This involves checking utilization levels; collecting actual use, trend, and weather information; and conducting any other necessary studies. These studies may include wildlife habitat, riparian vegetation, aquatic habitat, watershed conditions, and water quality.

Allotment evaluation will be conducted periodically at the end of grazing cycles or when significant changes in soil and vegetation occur. They will include assessments of changes in range condition, vegetation cover, litter, community age structures, plant vigor, wildlife habitat condition, and watershed condition. Various trend study methods will be employed to document trend in key areas.

The AMPs and development or activity plans will be revised as necessary. Revisions may include changes in the grazing system, livestock numbers, season of use, additional range developments, or any combination of these needed to attain management objectives. Monitoring strategies are being developed in an overall District rangeland monitoring plan, and specific monitoring activities will be identified for each AMP and custodial care allotment.

PUBLIC LANDS MANAGED BY THE BLM (ACRES)



LEGEND

Counties that do not contain BLM land

Map courtesy of *Bismarck Tribune.*

CHAPTER 2
THE ALTERNATIVES

The alternatives are described in both the short and long term. The short term is a five-year implementation period during which most proposed actions would take place. An exception to this time frame would be proposed land treatments. Before these treatments are implemented, grazing systems may need to be carried out for a longer period to determine if further treatment is needed. It is assumed that all responses to range developments would occur in the long term, 15 years after the implementation of an action. (See Table 2-1.)

Long-term vegetation use would be 25 percent of the average current year's vegetation production for livestock and 75 percent for nonconsumptive and wildlife uses in the first two alternatives discussed. Vegetation reserved for nonconsumptive uses exceeds the amount of vegetation removed by consumptive use in all alternatives.

Due to the limited data on vegetation and production, the following assumptions have been made in computing AUM figures for the various levels and the various alternatives. It is assumed that the AUM and stocking rate figures are valid, based on observation, professional judgment and current ecological range condition information in the EIS area. However, until these figures can be verified by monitoring and evaluation, they will be considered as target AUM stocking rate figures. Livestock licensed use during 1982 was 9,751 AUMs, which is estimated at 25 percent of the total vegetation base. Vegetation available for wildlife and nonconsumptive uses including range maintenance and watershed protection is 75 percent of total vegetation production (29,253 AUMs).

Cost estimates for each alternative are made with the understanding that any proposed range development will be modified or reduced in scale to avoid cultural sites that would require major excavation.

MANAGEMENT GUIDANCE COMMON TO ALL ALTERNATIVES

Allotment Categorization

All grazing allotments in the district have been assigned to one of three management categories based on present resource conditions and the potential for improvement. The M allotments generally will be managed to maintain current satisfactory resource conditions; I allotments generally would be managed to improve resource conditions; and C allotments will receive custodial management to prevent resource deterioration. None of the allotments in the district have been categorized as I. The three existing AMP allotments are in the M category.

Implementing Changes in Allotment Management

Activity or development plans are commonly used to present, in detail, the types of changes required in an allotment, and to establish a schedule for implementation. Actions set forth under the plan that affect the environment will be analyzed and compared to alternative actions. During the analysis, the proposal may be

TABLE 2-1

SUMMARY OF VEGETATION USE LEVELS BY ALTERNATIVE

	Alternative A Range Improvement	Alternative B No Action— Continue Present Management	Alternative C Reduced Livestock Use	Alternative D No Livestock Grazing
Existing AMP				
number	3	3	3	0
acres	20,403	20,403	20,403	0
Non-AMPs				
number	94	94	94	0
acres	36,017	33,017	36,017	0
Unleased acres	11,580	14,580	11,580	68,000
Livestock Grazing Preference AUMs				
short term	10,501	9,751	7,800	0
long term	11,234	9,751	8,987	0
Percent of total vegetation reserved for wildlife and non-consumptive uses	75	75	80	100

altered or completely revamped to mitigate adverse impacts. The following sections contain discussions of the types of changes likely to be recommended in an activity plan and the guidance that applies to these administrative actions.

Livestock Use Adjustments: Livestock use adjustments are most often made by changing one or more of the following: the kind or class of livestock grazing an allotment, the season of use, the stocking rate, or the pattern of grazing. For each of the four alternatives presented in this EIS, target stocking rates have been set for each allotment (refer to Appendix E). While most livestock use adjustments will occur in the M allotments, use adjustments are permitted for allotments in category C.

In reviewing the target stocking rate figures and other recommended changes, it is emphasized that the target AUM figures are not final stocking rates. Rather, all livestock use adjustments will be implemented through documented mutual agreement or by decision. When adjustments are made through mutual agreement, they may be implemented once the Rangeland Program Summary has been through a public review period. When livestock use adjustments are implemented by decision, the decision will be based on operator consultation, range survey data, and monitoring of resource conditions. Current BLM policy emphasizes the use of a systematic monitoring program to verify the need for livestock adjustments proposed on the basis of one-time inventory data.

Monitoring will also be used to measure the changes brought about by new livestock management practices and to evaluate the effectivenes of management changes in meeting stated objectives.

Instruction Memorandums WO-82-292, WO-82-650, and MT-82-89 discuss the applications of rangeland monitoring in more detail.

The federal regulations that govern changes in allocation of livestock forage provide specific direction for livestock use adjustments implemented by decision (43 CFR 4110.3-1 and 43 CFR 4110.3-2). The regulations specify that permanent increases in livestock forage "shall be implemented over a period not to exceed five years . . .," and that decreases in livestock forage "shall be implemented over a five year period . . ." The regulations do provide for decreases to be implemented in less than five years when: (1) the downward adjustment is 15% or less of the "authorized active grazing use for the previous year," (2) an agreement is reached to implement the adjustment in less than five years; or (3) a shorter implementation period is needed to sustain resource productivity.

All allotments in which range improvement funds are to be spent will be subjected to an economic analysis. The analysis will be used to develop a final priority ranking of allotments for the commitment of the range improvement funds that are needed to implement activity plans. The highest priority for implementation generally will be assigned to those improvements for which the total anticipated benefits exceed costs.

Unleased Tracts. Unleased tracts generally will remain available for further consideration for authorized grazing, as provided for in the BLM grazing regulations (43 CFR 4110 and 4130). However, certain tracts not currently authorized for grazing use will remain unleased. These tracts total approximately 11,580 acres (refer to Appendices F and G).

ALTERNATIVE A: RANGELAND IMPROVEMENT

This has been selected as the preferred alternative. Analysis of the alternative shows that the management goal of maintaining and improving rangeland condition, as outlined by MFP recommendations and decisions, can be reached through rangeland improvements, monitoring programs, and refinement of grazing systems.

Public response received during the scoping process and land use planning indicates a desire for improving management and utilizing rangeland improvements to optimize rangeland conditions for livestock and wildlife at or near the current stocking levels, targeting for intensive management those areas in less than good condition or where resource values are high.

This alternative proposes optimum management options for livestock, wildlife, and watershed.

Management emphasis is placed on areas identified as being in less than good range condition, areas where use patterns of livestock and wildlife conflict, and areas where rangeland potential is high. The present management program currently provides 9,751 AUMs to 97 allotments for grazing uses and 29,253 AUMs to nonconsumptive and wildlife uses.

Long-term target AUM figures (due to increased vegetation production through grazing systems and various land treatments and leasing of previously unleased lands) will be 11,172 AUMs to livestock and 33,516 AUMs to nonconsumptive and wildlife uses. The vegetation increases are distributed on the basis of 25 percent to livestock and 75 percent to nonconsumptive and wildlife uses.

To support these utilization levels, three existing AMPs, totaling 20,403 acres, would be revised based on monitoring of resource conditions. AMPs would not be developed at this time for the remaining 94 allotments, because the allotments are too small or the majority of the land is private and landowner dependency on them

is low. Three thousand acres of presently suitable but unleased lands would be brought under grazing permits. A total of 11,580 acres would remain as unleased land in scattered, small tracts, which are generally under water or otherwise without grazing potential.

Prioritization of management efforts would be guided by the BLM's Grazing Management Policy and Rangeland Improvement Policy, according to management needs. Grazing management will include monitoring of livestock grazing while maintaining or improving range conditions.

Grazing management systems, including rest rotation, deferred rotation, deferred, seasonal, short duration, or other systems which are variations or combinations of these would be implemented where needs are identified through monitoring. Season and number allotments in the custodial care category would generally have deferred or seasonal systems. Where the public land is a very small part of the ranch, seasonal use would be coordinated with the private land, providing that management goals can be met.

Development of range improvements on erodible areas will be avoided during the April—June period. Maintenance and new construction would not be allowed during wet periods and range improvements would generally not be located on floodplains or in wooded draws. Improved management and use supervision would result in improvement of riparian and wooded areas.

Land treatments would be implemented on about 600 acres to enhance rangeland values and provide 450 more AUMs for livestock use. Management fences would be needed to support grazing or land treatments and these would be built to assure movement of wildlife. About 12 miles of existing management fences that restrict wildlife movement would be modified to facilitate movement. Monitoring and surveys would determine if there is a need to develop new water sources to ensure better distribution of livestock and to optimize wildlife habitat. Those identified for wildlife needs would be fenced, with water gaps or offsite facilities for livestock where necessary.

Control of noxious weeds such as leafy spurge is proposed for 200 acres, using accepted herbicides that provide effective control. Biological control will be considered if proven effective. Special care would be taken with the use of pesticides around reservoirs and crucial widlife habitat.

The estimated cost of needed range improvements is $160,000, based on current average cost per improvement (see Appendix A). This estimate does not include costs for range improvements, fencing of water sources for wildlife needs (which have not been identified), or development of wildlife water sources, which would be identified through monitoring.

ALTERNATIVE B: NO ACTION — CONTINUATION OF PRESENT MANAGEMENT

This alternative would "freeze" the current range program as it is today. Initial and long-term use levels under this alternative, regardless of range condition or enhancement potential, would be 9,751 AUMs to livestock and 29,253 AUMs to nonconsumptive and wildlife uses. AMPs in effect would continue, but no new range improvements (reservoirs, fence, mechanical or chemical treatments, or pipelines) would be developed. Changes in levels of permitted livestock use would not be allowed, regardless of need, and no new management or activity plans would be implemented. Maintenance of current improvements would be allowed.

Essentially all future options in range management would be eliminated in this alternative. There would be no opportunity to correct erosion problems should they develop, to increase or decrease livestock numbers, to change kinds of livestock, to adjust seasons of use, or to improve range management.

By freezing the present use of vegetation, the consequences of continuing present range trends in the EIS area can be seen. The analysis shows future conditions of soil, vegetation, and watershed.

There would be no BLM implementation costs for this alternative, as fence maintenance is the responsibility of the operator and by 1984 maintenance cost of reservoirs, springs, etc., would also be their responsibility.

ALTERNATIVE C: REDUCED LIVESTOCK USE

In this alternative, particular emphasis would be placed on the watershed and wildlife resources. This analysis shows the benefits and disadvantages of giving priority in vegetation utilization and range management to resources other than livestock forage production, while allowing light to moderate grazing use by livestock.

Initial estimated utilization levels of vegetation would be 20 percent to livestock and 80 percent to nonconsumptive and wildlife uses.

Initial livestock AUM target figures in this alternative are 7,800 AUMs, 20 percent lower than the current permitted use of 9,751 AUMs. Initial target figures for nonconsumptive and wildlife uses are 31,954 AUMs. Long-term target figures based on projected increases in vegetation production (due to land treatments and implementation of grazing systems) are 8,987 AUMs to livestock and 35,949 AUMs to nonconsumptive and wildlife use. Lands that are presently unleased for livestock use would remain the same with vegetation reserved for wildlife and non-consumptive uses.

The three existing AMPs would be continued and management and activity plans would be implemented. Grazing treatments and AMP and allotment objectives would be govemed to meet the resource objectives of deferring grazing on floodplains and erodible areas during April—June and eliminating grazing on crucial wildlife, winter range, and riparian areas. Livestock would be excluded from reservoirs and other water sources identified for wildlife needs, with no provisions included for livestock watering.

Mechanical treatments and associated grazing treatments could occur on about 600 acres to support watershed and wildlife rangeland management objectives. Management fences needed to support grazing or land treatments would be the same as Alternative A. Additional fencing would be required to restrict livestock use of crucial lands (highly erodible areas, hardwood draws, etc.) where identified by monitoring.

Chemical control of noxious weeds would be the same as for Alternative A. Areas to be fenced to restrict livestock use have not been identified but the estimated cost of all range improvements under this alternative is expected to exceed costs identified in Alternative A by 20 percent.

ALTERNATIVE D: NO GRAZING

No livestock would be permitted to graze on public lands in this alternative. Current grazing privileges would be revoked. No range improvements would be built or maintained unless the improvements were considered necessary for watershed or wildlife resources.

This program would eliminate the current permitted livestock use of 9,751 AUMs. In the worst-case analysis BLM would require fencing of public lands to prevent livestock trespass. More than 650 miles of fences would be necessary for this undertaking, costing $1,495,000 according to current cost estimates. BLM would continue to monitor the rangeland for unauthorized use and wildlife habitat conditions.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVE

A comparison of the impacts on major resources is presented in Table 2-2. It was found that there would be no significant impacts and no significant differences in impacts between alternatives for regional economic impacts, cultural resources, and recreation. These components are, therefore, not included in the summary table.

Quantification of resource factors is given when possible. The reference point for determining change is the existing situation. During the years 1985-90, the selected grazing management alternatives or combination of alternatives would be implemented. Short-term impacts are those that would occur during this implementation period. Long-term impacts would occur approximately by the year 2005. The following discussion emphasizes the most significant impacts by alternative. The preferred alternative, based on public comments and management goals, is Alternative A "Rangeland Improvement."

Alternative A: Rangeland Improvement

Watershed condition would improve in the long term with a reduction of sediment and water yields by approximately 10% and 5%, respectively. Soil losses from range developments would be an insignificant short-term consequence. More vegetation production would result in improved watershed protection.

Ecological range condition would be maintained or improved to good to excellent condition on most lands. Areas in less than good condition (3,995 acres) would improve. Total vegetation production would increase approximately 6½% in the long term. Livestock AUMs would increase by 1,483 AUMs in the long term.

Wildlife habitat would improve with special consideration given to protect crucial habitat and wintering areas. More vegetation production would result in more residual cover available to wildlife.

Improved watershed and ecological range conditions would reduce the natural destruction of some cultural resource sites by erosion. Long-term loss of scientific data could occur if sites were destroyed by ground disturbances resulting from implementation of range projects and land treatments. However, most range improvements would be located to avoid cultural sites.

A long-term economic gain ($5,400 annually) would be realized by the three operations on AMPs. Permit values would increase by $55,200.

The total implementation cost of this alternative would be $160,000.

Alternative B: No Action, Continue Present Management

Watershed conditions would deteriorate in the long term. In the short term, there would be little discemible change.

In the short term, the general range condition and trend would continue. In the long term, they would remain static or decline due to lack of adequate monitoring and supervision.

TABLE 2-2

SUMMARY OF ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVE

Environmental Component	Existing Situation	Alternative A Range Improvement		Alternative B No Actions		Alternative C Reduce Grazing		Alternative D No Livestock Grazing	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Vegetation									
Good & Excellent	47,186	Increasing	Stabilized	Increasing	Stabilized	Increasing	Stabilized	Increasing	Stabilized
Fair	3,995	Decreasing	Decreased	Decreasing	No Change	Decreasing	Decreased	Decreasing	Decreased
Unclassified	16,819	Much of this is comprised of water and wetlands that are unsuitable for grazing. Inventory data is very limited.							
Livestock Grazing									
Preference (AUMs)	9,751	10,501	11,234	9,751	9,751	7,800	8,987	0	0
Nonconsumptive and Wildlife Use (%)	75	75	75	75	75	80	80	100	100
Watershed									
Sediment Yield	Decreasing	Decreasing	Decrease 10%	Decreasing	Increase	Decreasing	Decrease 12%	Decreasing	Slight Decrease (5%)
Water Yield	Decreasing	Decreasing	Decrease 5%	Decreasing	Increase	Decreasing	Decrease 6%	Decreasing	Slight Decrease
Water Quality	(*)	Improving	Slight Improvement	No Change	Decrease	Improving	Slight Improvement	Improving	Slight Improvement
Wildlife									
Habitat	Improving	Improving	Improved	Improving	No Change	Improving	Improved	Improving	Declining
Economics									
Number of Ranches	44	0	3	0	0	44	44	44	44
Ranch Income	$ 15,936 **	0	+$5,400	0	0	-$17,200	-$11,250	-$85,000	-$85,000
Permit Value	$866,500	0	+$55,200	0	0	-$177,400	-$118,900	-$866,500	-$866,500
Total Impact to Ranches		None	Insignificant	None	None	Significant to 3 ranches, other insignificant	Significant to 3 ranches, others insignificant	Significant	Significant
Impact to Area Economy		None	Insignificant	None	None	Insignificant	Insignificant	Insignificant	Insignificant
Social Impacts	44 ranches	No impact to social well being	Insignificant increase in social well being on 3 ranches	No impact to social well being	No impact to social well being	Significant decrease in social well being on 3 ranches	Significant decrease in social well being on 3 ranches	Significant decrease in social well being on 44 ranches	Significant decrease in social well being on 44 ranches

*Water quality coming off of shale derived soils in the Big Gumbo Area is low due to soil characteristics, not grazing. Water quality on the rest of the soil types is generally good.

**Estimated ranch income does not include income from cash crops (Table 3-5).

Wildlife habitats would continue as they are currently trending. No additional residual cover would be available for wildlife use.

There would be no implementation cost for this alternative.

Alternative C: Reduced Grazing

Watershed conditions would show improvement in the long term with a reduction in sediment and water yields by approximately 12% and 6%, respectively. Improvements would be mainly from lighter grazing pressure.

Initially, livestock AUMs would be reduced 1,951 AUMs. Long-term AUMs would be 764 AUMs less than currently permitted. Eighty percent of the vegetation production would be targeted for wildlife and nonconsumptive uses. Ecological range conditions would be maintained or improved to good or excellent condition on most lands. Vegetation condition would improve in riparian areas, around reservoirs, and on erosion-susceptible areas.

Wildlife habitat would improve for big game, upland game, and waterfowl as would non-game habitat. Increased residual vegetation for cover would be available to wildlife. Special considerations would be given to protect crucial habitat and wintering areas.

A short-term economic loss ($17,200 annually) would affect 44 operations with a long-term loss of $11,250 annually. Permit value would decrease by $177,400 in the short term and $118,900 in the long term.

Alternative D: No Grazing

The net effect of the elimination of livestock grazing on public lands on watershed conditions would be relatively small. Sediment yields would be reduced about 5% and water yields by an insignificant amount. The potential would exist for declining watershed conditions due to vegetation stagnation.

Ecological range condition would initially show improvement, then stabilize and show some decline due to lack of grazing stimulus necessary for vegetative production.

Wildlife habitat would improve initially, but would trend toward climax or decadent conditions, which is less desirable habitat.

This alternative would result in a short- and long-term annual decrease in ranch income of $85,000 for 44 operations. Permit value would decrease by $866,500. This would be a significant impact to the operators.

Total implementation cost of this alternative would be $1,495,000 (the cost to fence off public land with approximately 650 miles of fence).

CHAPTER 3
AFFECTED ENVIRONMENT

VEGETATION

North Dakota is situated on the eastern edge of the Northern Great Plains. Prior to settlement, the land was dominated by a prairie grassland cover. Trees and shrubs are limited to areas where the topography favors adequate soil moisture storage, such as drainage ways, river bottoms, and depressions. Less than 2% is forested. There is a wide diversity of grass and forb species, forming many different plant communities. Total annual forage production ranges from 400 lbs. per acre on thin clay to over 3,800 lbs. on overflow sites.

The mixed grass prairie is found in the drier region of the western half of the state. There are minor inclusions of hardwood draws and associated shrubs. Junipers are common in the Badlands. Silver sage is abundant in the western counties, and big sage occurs in limited amounts.

The transitional zone lies north and east of the Missouri River and changes to a tall grass prairie on the east end of the state. This is the Prairie Pothole Region. The added feature to this grassland zone is the wetland vegetative types associated with the potholes. There are minor occurences of oak, aspen, birch, and willow. Because of agricultural practices, the Tall Grass Prairie is almost nonexistent.

Range Condition and Trend

Ecological range condition—expressed as excellent, good, fair or unclassified—reflects the current vegetation composition of the rangeland in relation to the potential climax plant community.

Range condition for BLM grazing lands is 85% good-excellent condition, 7% fair, and 8% unclassified (BLM inventories, 1979-82). (See Table 3-1.) The trend is up on the AMP allotments. The trend information on the rest of the allotments is limited. The isolated tract inventory data indicates that the trend is stable or better.

The Soil Conservation Service periodically rates range condition for private rangeland on a statewide basis. They currently report over 60% of the private rangeland in good to excellent condition and 39% in fair and poor. Long-term trend is up (Gerbig, B., 1983; Runner, B., 1983; USDA, SCS 1980). This information is included because over 60% of the BLM rangeland is intermingled with private rangeland.

Allotments listed as unclassified lack or have limited inventory data. Much of this land is under water. Most is located along the Missouri River, beneath lakes Sakakawea and Oahe, and in the central pothole region of the state. There are close to 10,000 acres of wetland and submerged acres, and an estimated 3,000 acres of other lands suitable for grazing.

Leafy spurge is the primary noxious weed known to exist on BLM lands in the District. It is found on several tracts in McHenry County and on one tract in Williams County. The BLM District Office presently is assessing the problem in cooperation with the county weed control committees.

At this time there are no plants listed as "threatened or endangered" in North Dakota; however, the state does have a list of "rare and unique" plants (Barker, W.T., et al, ND). These are generally found in small, isolated, protected areas. One that has been identified on BLM lands is the ponderosa pine stand in the Big Gumbo Management Area. Other areas where rare or unique plants might be found are near Lost Bridge, on the scattered tracts along the Missouri River, and in the pothole region.

LIVESTOCK

On the 97 BLM allotments there are 94 operators leasing 53,420 acres, with a current authorized use of 9,751 AUMS. All are individual allotments, ranging in size from 15 acres up to 8,925 acres.

TABLE 3-1

RANGE CONDITION SUMMARY FOR BLM ADMINISTERED LANDS

	Good and Excellent	Fair	Unclassified	Total
Existing AMPs	20,403 ac.	—	—	20,403 ac.
Custodial Allotments	24,999 ac.	3,506 ac.	4,522 ac.	33,927 ac.
(% of lands under grazing lease)	(85%)	(7%)	(8%)	(100%)
Unleased Lands	1,784 ac.	489 ac.	12,297 ac.	14,570 ac.
Totals	47,186 ac.	3,995 ac.	16,819 ac.	68,000 ac.

Source: BLM inventories 1979-82

The three AMP allotments are the only ranch units using BLM lands with a high percentage of federal range (over 60%). The percentage of federal range on the other units runs between 1 and 25%, averaging 5% (see Appendix E). Percentage of federal range is based on the grazing allotment not on the total ranch unit, as in the economic section.

Most operators run a cow-calf operation, with an average herd size of 200 head. There are four operators that run both sheep and cows, and four that run yearlings. Season of use is May through November. Supplemental feeding usually is required for the rest of the year. Most ranches have some cash crop included in their operation. The ranches are typically family-owned and operated.

In 1968 and 1969 AMPs were developed on three allotments in western Bowman County which contain the only block of BLM lands in the state lending itself to intensive range management. The rest is managed on a custodial basis. At the time of implementation the stocking level on these allotments was reduced by 1/3 and grazing systems were started. Significant improvement in range condition has resulted. Some of the pastures, however, are still deficient in stock water development.

WATERSHED

Soils

The soils in the EIS area are derived mainly from soft sedimentary bedrock, alluvial materials, glacial lake and outwash sediments, and, to a small extent, glacial till (Omodt, D.T., et al 1968; USDA, SCS 1980). For descriptive purposes in this EIS, approximately 60 soil series and land types were grouped into 7 geomorphic soil subgroups, as displayed in Table 3-2. The wide range in parent materials and soils reflects the pattern of small parcels of public land being scattered across the entire state. The table indicates the proportion of BLM land in each subgroup. As can be seen, most of the BLM land acreage is composed of soils formed in the soft sedimentary bedrock of southwestern North Dakota.

About 78 percent (53,092 acres) of public lands in the state have moderate to high potential for water erosion. Soil subgroups 3, 4, 5, and 6 fall into this category because of infiltration, permeability, texture, structure, and slope. Public lands in areas dominated by subgroups 1, 2, and 7 have slight to moderate water erosion hazards. Wind erosion potential is high for subgroup 7 because of coarse textured soils (USDA 1974-83).

Public lands composed of alluvial soils in subgroup 1 are primarily small scattered parcels found along major drainageways, or in the vicinity of ponds, marshes, and potholes. In fact, about 6,800 of the 10,082 acres in this category are covered by water.

Severe drought may expose some of the soils normally covered by water for brief periods of time. However, there is little opportunity for mechanical treatment of these soils because of the small, scattered nature of the tracts and the wet conditions often encountered.

Soil subgroup 2 comprises only about 1,843 acres of public land. Soils in this category have formed in glacial till (Omodt, D.T., et al 1968; USDA, SCS 1980). Most of this land occurs in parcels of 40 acres or less scattered across northern and eastern North Dakota.

Subgroup 3 is composed of soils formed in soft shales and sandstones. They are primarily shallow soils on strong slopes and hills located in the unglaciated southwest portion of the state or next to the Missouri River where the thin glacial mantle has been eroded off. The parcels of public land in this category are also scattered to such an extent as to make mechanical treatments unfeasible.

Soils in subgroup 4 are primarily those with sodic claypans and sandy profiles found on scattered tracts in Bowman County (Patterson, D.D., et al 1968; USDA 1975). Soils with sodic claypans, such as Absher and Rhoades, will respond to contour furrowing, but because of the small size (40- and 80-acre tracts) and scattered public land pattern, this treatment is not practical.

Soil subgroup 5 covers the largest block of public land in North Dakota. It is found on the Cedar Creek anticline in Bowman County. The Dilts and Lisam soils derived from Pierre shale comprise most of the area and do not respond well to mechanical treatments because of topography, slope, soil texture, and water erosion potential (USDA, 1975). However, there is some Absher-like soil in this subgroup that does respond well to contour furrowing. Some of the BLM land with this soil has already been contour furrowed and there are almost 600 more acres that could possibly be treated in this manner. Subgroup 6 is primarily composed of badlands on public lands along the Little Missouri River. Most of the acreage is located on very rough terrain in northern Dunn County. This land is unsuited to mechanical treatments because of the nature of the landscape.

Soils comprising subgroup 7 are derived from glacial lake and outwash sediments. Most of the acreage in this category is found on scattered tracts of public land in McHenry County. Most of the soils are very sandy and, therefore, the main concern is to ensure that an adequate cover of vegetation is maintained to prevent wind erosion (USDA, 1977).

TABLE 3-2
SOILS OF THE PUBLIC LANDS

Soil Subgroup and Orders	Soil Characteristics and Landscape Position	Selected Soil Series	Percent of Public Land	Location in State	Predominant Land Capability Classes Included	Water Erosion Susceptibility	Wind Erosion Susceptibility
1. Soils of the Floodplains, Fans, Low Terraces and Wetlands. Entisols, Aridisols, Inceptisols, Mollisols.	Nearly level to strongly sloping (0-15% slopes) clayey, loamy and sandy soils on floodplains, fans, low terraces, and in marshes, ponds, and potholes.	Absher, Banks, Cherry, Glendive, Hanly, Havre, Havrelon, Korchea, Lallie, Lohler, Ojata, Toby, Trembles, Vanda, Zeona.	14.9% (10,082 ac.)	Scattered across the entire state but highest concentrations along the Missouri River, and the pond and pothole areas in Divide, Kidder, and McHenry counties.	IV, V, VI	Low to Moderate	Low to Moderate
2. Soils of the Glaciated Till Plains. Mollisols and Entisols.	Undulating to hilly (3-30% slopes) loamy soils formed in glacial till.	Barnes, Buse, Emrick, Pram, Hamerly, Heimdal, Langhei, Max, Svea, Williams, Zahl.	2.7% (1,843 ac.)	Very scattered in northern and eastern North Dakota. The highest concentration is in Mountrail County.	IV, VI	Low to Moderate	Low
3. Soils of Dissected Sedimentary Bedrock Plains and Hills. Entisols, Inceptisols, Mollisols.	Strongly sloping to steep (8-45% slopes) loamy and sandy soils derived from shales, siltstones, sandstones, and remnants of glacial till.	Arikara, Brandenburg, Cabba, Cabbart, Chama, Cherry, Cohagen, Flasher, Fleak, Morton, Rhame, Tusler, Vebar, Wayden, Yawdim, Zahill, Zahl.	8.8% (5,977 ac.)	The unglaciated southwest corner of the state and next to the Missouri River where the thin glacial mantle has been mostly eroded off.	VI, VII	Moderate to High	Low to Moderate
4. Soils of Dissected Sedimentary Bedrock Plains and Hills. Aridisols, Entisols, Mollisols.	Nearly level to moderately steep (0-25% slopes) clayey, loamy, and sandy soils formed in soft shales, siltstones and sandstones.	Absher, Boxwell, Cabbart, Desart, Ekalaka, Fleak, Kremlin, Ladner, Rhame, Rhoades, Tusler, Zeona.	10.0% (6,808 ac.)	Western Bowman County	IV, VI	Moderate	Moderate
5. Soils of the Dissected Shale Uplift. Entisols, Aridisols.	Strongly sloping to steep (8-45% slopes) clayey soils formed in Pierre Shale on the Cedar Creek Anticline.	Absher, Dilts, Lisam, Moreau, Shale Outcrop (Misc. Land Type), Wayden, Yawdim.	31.3% (21,260 ac.)	Extreme western Bowman County	VI, VII	Moderate to High	Low
6. Soils of Dissected Badland Areas. Badlands and Entisols.	Steep and very steep (25-70% slopes) clayey, loamy and sandy soils of highly dissected river breaks and eroded areas.	Arikara, Badlands (Misc. Land Type), Brandenburg, Cabba, Cabbert, Cherry, Flasher, Fleak, Shale and Sandstone Rock Outcrop (Misc. Land Type), Sham, Tusler.	28.1% (19,047 ac.)	The Little Missouri River Badlands, primarily in northern Dunn County.	VII, VIII	High	Highly Variable
7. Soils of Glacial Lake and Outwash Sediments. Mollisols and Entisols.	Level to rolling (0-15% slopes) clayey, loamy and sandy soils formed in glacial lake and outwash sediments.	Brantford, Divide, Hamar, Hecla, Maddock, Renshaw, Serden.	4.2% (2,846 ac.)	Most all is found in McHenry County.	VI	Low	High

Surface Water

The major river systems that drain North Dakota are the Missouri, which drains the southwestern part of the state to the Gulf of Mexico, and the Red River, which drains the northeastern half of the state to the Hudson Bay. Most of the public lands in the state are in areas that drain to the Missouri River. There are four general hydrologic characteristic groups into which the public lands can be placed. They are badlands, upland prairie, upland glaciated prairie, and floodplain.

The badlands have very dense drainage networks. Stream channels are deeply cut into the easily eroded sandstone and shale beds, so slumping and headcuts are common. The slopes are steep, and vegetation cover varies from good to none at all. These conditions result in large amounts of dissolved solids and suspended sediments being in stream flow.

The upland prairie areas have a medium textured drainage pattern. The topography is rolling with few steep slopes. Stream channels have stable banks and are well defined. Vegetation is primarily grassland with occasional woody draws. Because of the gentle slopes and good cover, sediment is not usually a problem in this area. Concentations of dissolved solids are high, however, consisting of sodium sulfates and bicarbonates.

The upland glaciated prairie forms the drainage divide between the Missouri and Red River systems. The surface drainage here is poorly developed, with many closed pothole basins. Water persistence in these pothole ponds varies from a week or two during the wettest part of the year to perennial water. Stream channels are stable and often have permanently ponded segments.

The quality of water in these ponds will depend on the relative volumes of inflows and outflows and could vary from low dissolved solid levels to highly saline levels. Sedimentation under grassland conditions in this area is minor.

Floodplain areas cover a very small portion of the state but are unique. These are areas that occur along the larger streams and consist of flat alluvial deposits. Vegetation on these areas usually consists of wooded areas and grasslands. These areas are very sensitive from a hydrologic point of view because they serve as the channel bottom for large, high-energy runoff events.

There are about 40 reservoirs on public land and almost all of these are located on public land in western Bowman County. Figure 3-1 shows estimated water and sediment yields. Much of the information presented in this chart was taken from the Big Dry Resource Area in eastern Montana, because of the similarity in hydrologic conditions.

Groundwater

Groundwater in North Dakota is evenly distributed over the state, but wells in most aquifers yield small amounts of water. These yields are usually adequate for domestic and livestock uses. There are seven primary water-yielding zones located beneath the state. These and a few of their characteristics are listed in Table 3-3, according to their sequence in the stratigraphy. Generally, these are sedimentary formation aquifers of sand or lignite. Exceptions to this are the alluvium and till aquifers. Alluvial aquifers occur along the major rivers of the state and till aquifers occur mostly in the central part of the state. In the areas adjacent to the Missouri River and glaciated coteau, there are glacially buried

TABLE 3-3

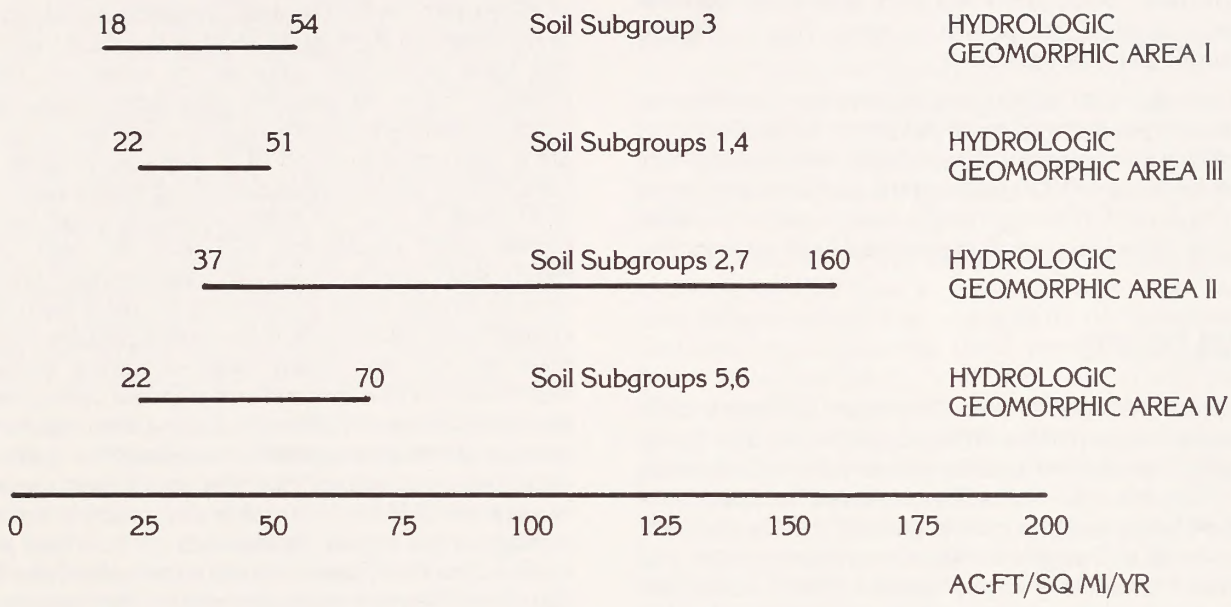
PROPERTIES FOR THE MAJOR NORTH DAKOTA GROUND WATER ZONES

System/ERA	Formation	Water Quality	Depth (feet)	Yield (gpm)
Quaternary	Alluvium and Glacial Drift	Saline or Fresh	0—500	0—500
Tertiary	Fort Union	Saline or Fresh	0—1100	0—100
Cretaceous	Fox Hills—Hell Creek	Saline or Fresh	Few—2500	0—150
	Pierre	Saline	—	0—100
	Dakota	Saline	100—5600	0—500
Paleozoic		Saline	150—13,500	—
Precambrium		Fresh	300	Few

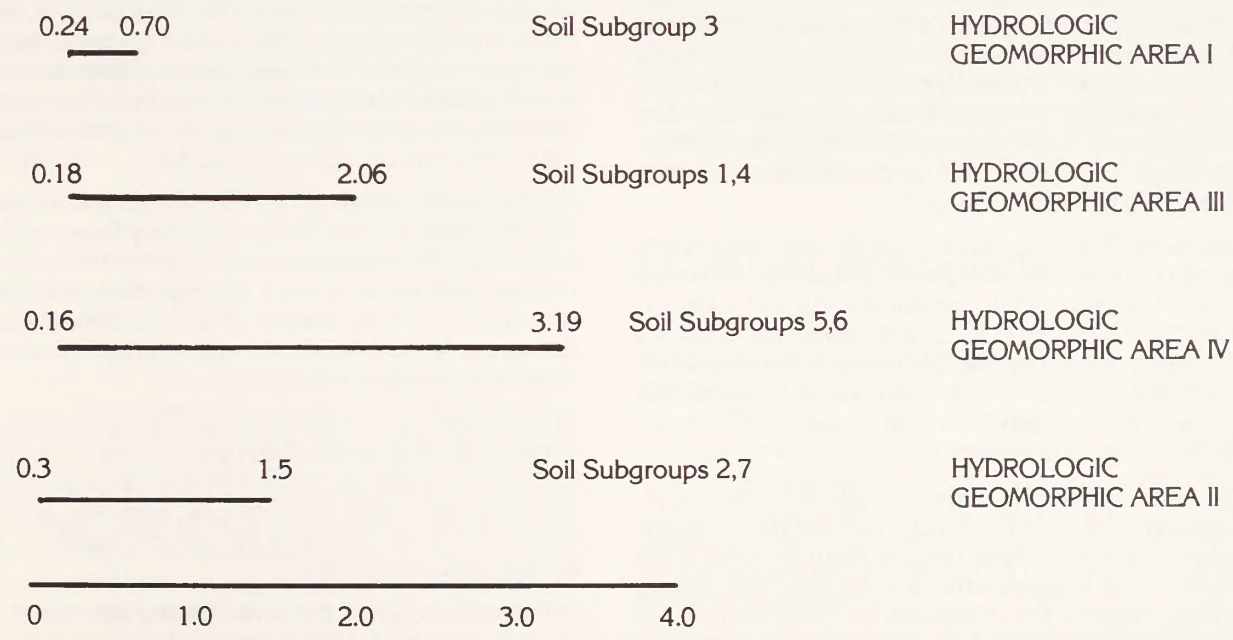
Source: Mineral and Water Resources of North Dakota, Bulletin 63, North Dakota Geological Survey, E.S. Noble—State Geologist, 1973.

FIGURE 3-1

WATER YIELD RANGES



SEDIMENT YIELD RANGES



Note: See Table 3-2 for description of soil subgroups.
Source: BLM BigDry EIS, Feb. 1982

stream courses that produce water at some of the highest rates found in the state. In extreme western Bowman County, there is a large area where no fresh water aquifers are known to exist. This is the Big Gumbo Management Area.

Generally, wells tapping aquifers in the Fox Hills-Hell Creek Zone and above will yield fresh water. Dissolved solids concentrations of these fresh water aquifers usually are in the 1,000-3,000 mg/l range but locally can be as high as 10,000 mg/l. In the eastern part of the state some of the lower aquifers may yield fresh water locally.

WILDLIFE

Wildlife habitats in the Dickinson District include diverse combinations of vegetation, water, and topography. A diversity of species and numbers of individuals occupy the area. The widely scattered land pattern of BLM lands includes prairie pothole habitat and badlands, as well as grasslands, some riparian areas, and limited amounts of sage-grassland. With the exception of lands in the Lost Bridge Management Area and Big Gumbo Management Area, BLM lands contribute only a very small part to the habitat requirements for the local populations of wildlife, due to the small and scattered nature of the tracts. In areas where heavy agricultural use occurs, BLM lands, in conjunction with state and other federal lands such as wildlife refuges, provide pockets of publicly owned native habitat which help to maintain and enhance wildlife diversity. Approximately 2.3 million acres of publicly owned land (not including lands controlled by the Bureau of Reclamation and Army Corps of Engineers) are either in native habitat or managed for wildlife. BLM lands contribute approximately 68,000 acres (3%) to this.

Due to the dynamic nature of wildlife populations and mobility of many wildlife species, population estimates for BLM lands would be misleading and highly inaccurate. At present, 29,253 AUMs are available to wildlife and nonconsumptive use. Of this, approximately 4,000 AUMs are estimated to be consumed by all wildlife species, the remainder being available for cover requirements of the species.

Resource inventories indicate that adequate cover exists on most BLM tracts to provide for cover requirements of the individuals utilizing them. In those areas where cover requirements are not fully met due to grazing impacts, the problem is generally the result of poor distribution rather than improper allocation of vegetation. These areas are generally small and cannot be aggressively managed by the BLM for grazing.

Water sources for wildlife on BLM lands in the western part of the state consist of small isolated springs and seeps, stockwatering ponds, and intermittent and perennial streams. Most of the stockwatering ponds are located in the Big Gumbo Management Area.

In the eastern part of the state, wetlands provide much of the water on BLM lands. Most of the BLM tracts do not have permanent sources of water on them, although there are generally permanent streams or stock ponds nearby on private lands. Springs and seeps are a rare occurrence on BLM lands. At present, the condition of riparian vegetation along most streams on BLM lands is good or better, providing good wildlife habitat (BLM inventories, 1979-82). In most cases nearby stock ponds or easily accessible stream bottom land on private lands divert livestock away from concentrating on BLM lands. In the prairie pothole region, there are not any known cases of severe livestock depredation on the wetland and adjacent upland vegetation on BLM lands, although grazing does reduce the amount of residual vegetation necessary for optimum waterfowl production. For the most part, upland acreage on BLM land is small in proportion to wetland acreage in this region. Stockponds on BLM land have received the most use by livestock and some have less than desirable vegetative cover around them due to the concentration of livestock around them during certain times of the year. At present, distribution of stock ponds and other sources of man-made water supplies (stocktanks, windmills or wells, watersavers, etc.) on the larger blocks of BLM land do not provide for optimum dispersal of livestock which would reduce heavy concentration around water sources, nor is the distribution of these water sources optimum for wildlife species. Needed water sources have not been identified and the condition of wildlife habitat around existing sources has not been fully assessed. Monitoring would allow management decisions on a case-by-case basis.

Hardwood draws are a limited habitat type in North Dakota. They are estimated to occupy less than one percent of BLM surface lands in the state. Wildlife use of hardwood draw habitats is disproportionate to their occurrence. The condition of the hardwood draws appears to be correlated to the size and type of grazing operation as well as topography.

In the eastern part of the state, grazing operations are generally smaller, season-long use is prevalent, and the topography is gentler. In this area the hardwood draws are generally impacted more by livestock grazing. Understory is reduced and the general quality of the habitat for wildlife is less.

In the western part of the state, grazing operations are generally larger, grazing systems are more prevalent and topography tends to be steeper. The condition of the hardwood draws in this area tends to be better, with better understory and reproduction of tree species. As a result of this, wildlife habitat quality tends to be better.

All of the hardwood draws on BLM land are found in areas where implementation of AMPs is not feasible.

Approximately 16,000 acres of well aggregated BLM tracts are found in the Badlands of Dunn County (Lost Bridge Management Area). This area typically provides excellent wildlife habitat, supporting concentrations of raptors, mule and some white-tailed deer, and a small elk herd. Most of the BLM land is found in the rougher, more inaccessible terrain with the more productive bottomlands being in private ownership. The overall condition of wildlife habitat on BLM lands in this area is good (BLM inventories, 1979-82). The area is topographically suited for bighorn sheep cover requirements and is a potential site for reintroduction, the original populations having become extinct by the early 1900s. Free water is not well distributed in the area, the major source being the Little Missouri River; in general, wildlife water sources are not considered optimal.

The major block of BLM lands located in Bowman County (the Big Gumbo Management Area) is managed under AMPs for grazing. The most numerous big game species in this area is the pronghorn antelope. Mule deer are commonly seen but are not numerous on BLM lands due to natural habitat limitations. Sage grouse are found in the area as are sharp-tailed grouse, but they are seldom seen on BLM lands, again due to natural habitat limitations. The soils are young and have low productivity. Big sage (Artemesia tridentata) is stressed due to the limitations of the soils and averages nine inches or less in height and has a patchy distribution, well below the optimum for most sage grouse cover requirements. Where better soils occur outside the management area, wildlife usage increases due to the better habitat associated with the soils. There are several stockponds within the management area which provide water necessary for wildlife but distribution is not optimal.

Several miles of net wire fencing were installed as interior fences when the allotments were initiated. These preclude free movement of pronghorns and constitute a hazard to deer. Current management plans call for modifying the fences to alleviate the problem. Two grazing exclosures were installed in the management area in the late 60s when the grazing systems were initiated. These have been abandoned, but during the course of the study and to date, there is little discernable difference between grazed and ungrazed plots. Photographic records of the study area and photo points of other areas indicate that cover has increased and vegetative vigor has increased since the implementation of the AMPs. Photographic evidence also indicates that major drainages are stabilizing since the AMPs were put in effect. Generally, most of the management area is in good or better ecological condition. Some areas of heavy utilization by livestock are evident due to distribution problems, which will need to be addressed during AMP evaluation.

Fishery resources on BLM lands are limited. There are only about 8 miles of perennial streams that go through or border BLM lands statewide. Very few BLM tracts have more than 1/4 of a mile of perennial stream on or adjacent to them.

Drainages are well vegetated and vegetative cover is good (BLM resource inventories, 1982). At present, the watershed is improving over what existed before implementation of the AMPs, and there have been no identified adverse effects on fisheries in the Little Missouri River resulting from grazing in the management area.

The potential for threatened and endangered species occurring on BLM land is generally low. For the most part, suitable habitat does not exist for the threatened and endangered species (bald eagle, black-footed ferret, peregrine falcon, and whooping crane) that either migrate through or could potentially be found in the state. Some wetlands in the eastern part of the state could provide stop-over or resting areas for whooping crane, and bald eagles could potentially nest on BLM tracts along the Missouri River. Further investigations are needed to determine the likelihood of this. The peregrine falcon is occasionally seen migrating through the state, but no longer nests here. Currently, there are no immediate plans for reintroduction. Prairie dog towns, which are considered essential for black-footed ferrets, are seldom found on BLM land, generally due to topographic or soils limitations. Only four known towns are located on or adjacent to BLM lands. No sightings of ferrets have been reported in or near these areas. Distribution of prairie dog towns on and near BLM lands do not conform to the parameters identified in the Black-footed Ferret Recovery Plan for optimum habitat. Continued periodic monitoring of prairie dog towns on BLM lands will provide information on possible ferret occurrence.

CULTURAL RESOURCES

A class I overview for the Dickinson District, which details the prehistory and history of western North Dakota, has been completed for the BLM by the University of North Dakota. This document details all of the existing data for the area, and is the source of the general cultural resources information for this EIS. It demonstrates, with detailed descriptions, that the northern plains area contains prehistoric and historic sites representing a continuum of at least 12,000 years of human occupation.

Of the BLM public lands in the state, about 10% are under water or marsh. The approximately 61,200 remaining acres contain 23 known cultural resource sites according to a files search at the Heritage Center in Bismarck. Eighteen of these sites occur in Bowman County. These sites are summarized according to type and location in Table 3-4.

TABLE 3-4

CULTURAL RESOURCE SITES ON BLM-ADMINISTERED SURFACE

County	Jumps	Cultural Material Scatter	Quarry	Hearth	Stone Circle/ Rock Feature	Historic
Bowman	3	11	1	2		1
Dunn			1			
Golden Valley		2				
Williams					2	

Source: BLM, 1982.

The lack of recorded cultural sites on BLM-administered surface is due in large part to an insufficient amount of inventory. Approximately 4.2% of these lands have been inventoried for cultural resources, and many of the uninventoried tracts reveal a potential for supporting cultural sites. For example, one tract is adjacent to a recorded earthlodge village. Another tract is near a rock shelter site. Several tracts are surrounded by cultural material scatters, stone circles, historic sites and jump sites, as well as by paleontological locations. Still others are simply in excellent environmental locations.

The level of inventory does not allow qualification of cultural resources within the area potentially affected by range management decisions. However, given the discussion in the paragraph above and the large numbers of cultural resource sites recorded in proposed or existing coal mining areas in North Dakota, the BLM expects that sites representing many of the prehistoric and historic time periods will be located in areas where stock grazing occurs.

RECREATION

The Bureau of Land Management has jurisdiction over only .15% of the total surface lands in North Dakota. By far the most important recreational use of BLM lands in the state is hunting and its associated ORV use. Other types of recreational use could include photography and very small amounts of hiking for purposes of observing nature, geology, and paleontology. Some collecting of rocks and fossils could also occur. It must be kept in mind, however, that lack of legal access to most of these areas and the small size of many of the tracts keeps recreational uses to a minimum.

Regional Economic Conditions

Earnings and Employment

The West River Resource Area contains 91 percent of the BLM AUMs permitted in North Dakota, with 58 percent in Bowman County. This analysis will focus on conditions in the resource area.

Figures for 1974 and 1979 indicate agriculture to be the main source of employment and earnings (Tables 3-9 and 3-10). Retail trade, services and government contributed the next largest portions of employment and earnings. With increased energy development, mining and construction contributed a large portion in 1979. Dickinson and Bismarck serve as major trade and service centers for the region. From 1974 to 1979, total employment increased by 24 percent (37,554 to 46,523). This compares to a statewide increase of 11 percent. Total earnings in the resource area in 1974 and 1979 were $360 million and $532 million, respectively. For the same time period, total earnings in North Dakota were $2,950 million and $3,712 million.

ECONOMIC AND SOCIAL CONDITIONS

The economic and social analysis will concentrate on 14 counties in west-central and southwest North Dakota where the majority of the BLM's currently permitted livestock AUMs are located. These counties are Adams, Billings, Bowman, Dunn, Golden Valley, Grant, Hettinger, McKenzie, Mercer, Morton, Oliver, Sioux, Slope and Stark. There are two communities in the study area with a 1980 population greater than 3,000 (see Table 3-5). These are Mandan, in Morton County, and Dickinson, in Stark County. Both of these cities had 1980 populations of approximately 16,000, which represented substantial growth during the 1970 to 1980 decade. Mandan and Bismarck (in Burleigh County just to the east of Mandan) and Dickinson serve as regional trade and service centers.

Table 3-6 displays population characteristics for the counties in the study area and for North Dakota. The study area contains 15% of the total population of North Dakota and—with the exceptions of Mercer, Morton,

and Stark counties where urban areas are located—is relatively sparsely settled. During the decade 1960 to 1970 every county in the study area lost population. This loss continued during the following decade (1970-1980) for many of the more rural counties. However, during the same period three counties, Mercer, Morton, and Stark, experienced a more than 20% increase in population. The farm population in the counties varies from a low of about 12% in Stark and Morton counties to a high of over 60% in Billings and Slope counties. The two counties with the most BLM land, Bowman and Dunn, had 23% and 48% of their respective population designated as farm in 1980.

TABLE 3-5

POPULATION OF INCORPORATED PLACES OF 1,000 PERSONS OR MORE

Place	County	1980 Population	% Change 1970-1980
Hettinger	Adams	1,739	5.1
Bowman	Bowman	2,071	17.5
Beach	Golden Valley	1,381	-1.9
Mott	Grant	1,315	-3.9
Watford City	McKenzie	2,119	19.9
Beulah	Mercer	2,878	114.1
Hazen	Mercer	2,365	90.7
Glen Ullin	Morton	1,125	5.1
Hebron	Morton	1,078	-2.3
Mandan	Morton	15,513	39.8
New Salem	Morton	1,081	14.6
Belfield	Stark	1,274	12.7
Dickinson	Stark	15,924	28.4

Source: U.S. Dept. of Commerce, Bureau of the Census, 1980 Census of Population and Housing, North Dakota, Final Population and Housing Unit Counts, PHC 80-V-36, 1981.

Ranch Related Economic Conditions

At the end of 1979 there were 7,686 ranches in the study area and 41,137 ranches in the state (Census of Agriculture, USDC, 1980). There are currently 94 individual ranch operations with permits to graze BLM lands in the state; 64 of these are located within the 14 county study area. Ranch operations with permits to graze comprise less than one percent of the ranchers in the state and in the study area. The counties with the highest percentages of ranch operations with BLM grazing are Bowman (8.5%), Dunn (2.0%), and Golden Valley (1.8%).

Fifty of the 94 operations have permits for fewer than 25 BLM AUMs. The dependency of these operations on forage from public lands and the potential impact of grazing adjustments on their operations is not considered significant. Therefore, this analysis concentrates on the remaining 44 operations.

The 44 ranch operations were placed into 5 categories according to the numbers of livestock raised and their dependency on BLM AUMs (Table 3-7). Although there are a few ranches that raise sheep and yearlings, the predominant type of ranch is a cow/calf operation. Substantial cash crops, primarily wheat, are raised on many operations. However, this analysis will include only the livestock portions of the operations. Where sheep, horses, or yearlings are involved, the total number has been converted to equivalent cow units. The ranchers are fairly evenly divided over the small and medium size categories; less than 10 percent have more than 600 cows.

Dependency of ranch operations on BLM forage is determined by a combination of several factors: the percentage of total required forage that public lands provide, the seasons the forage is available, and the availability of substitutes for the forage. The percentage of dependence on public lands is the primary indicator; Table 3-7 shows the average dependency according to ranch size categories. The size category 251-600 cow units is broken into two groups because of the wide variation in dependency on BLM forage. Excluding the 3 ranches in the 251-600 brood cow category that are about 35% dependent, the average ranch is less than 8% dependent on BLM forage.

Table 3-8 shows the estimated returns to family labor and investment (returns above cash costs and depreciation). This is the amount available to the operators and their families for their labor, management and return to equity capital. Returns per ranch were estimated by formulating a budget for a representative ranch for each of the size category/dependency combinations (see Appendix B). On the basis of 1980, 1981 and 1982 average prices, only ranches with more than 600 cows and those with 400 cows and a high dependency on BLM AUMs earn enough to cover variable costs and depreciation. During this time period (1980-82) the livestock industry was depressed with declining prices for end products and increasing costs of production. However, each category will cover variable costs and therefore able to continue operating, at least in the short term.

Some of the ranch operators and their families are employed off the ranch to supplement their incomes, others raise substantial cash crops. If operators do not have off-ranch employment or crop income, and the returns are not enough to cover daily living expenses, they usually allocate funds from the depreciation allowance in the short term. If this happens the operators must live with deteriorating equipment and without improvements and borrow on their equity when replacement becomes necessary.

Permit Value

The BLM does not recognize the right of permittees to treat grazing permits as real property. These permits do have value, though, and are bought and sold in the market place and used as collateral for loans (McConnen, 1976). The value of the permits varies considerably. If the permit is for small, isolated, land-locked tracts of public lands, the value is minor. Where public lands provide a large block of grazing the permit value can be substantial. Permit value is difficult to estimate because it usually is not separated from the total value of the ranch. Ranches are usually valued and sold on a cow-unit basis. It is estimated that an average value for BLM grazing permits is approximately $100 per AUM or $1,200 per animal unit. Table 3-8 presents the average permit values for different sized ranches.

Social Conditions

Attitudes

No specific information is available regarding study area residents' attitudes toward grazing issues. During the public involvement phases of this plan, very little response was received. However, it can be assumed that residents want to preserve their current lifestyles and would favor plans that enhance ranch operations and oppose actions that would negatively impact ranch operations.

Social Well-Being

Table 3-11 presents objective indicators of social well-being for the state and for counties within the study area. The high proportions of people under 20 and over 65 indicate that out-migration of people in the working age group may be occurring in many of these counties. This percentage of residents graduating from high school is lower for most of the counties in the study area than for the state. In the more rural areas, compared to the state as a whole, family income tends to be lower and there is a higher proportion of families with income below the poverty level. In addition, the percentage of housing that lacks complete plumbing is higher for many counties than for the state. In 11 of the counties the farms and ranches are decreasing in number and increasing in size, although in only 4 of these cases is this occurring at a rate faster than for the state as a whole.

Although most of the objective indicators suggest negative factors, there are positive factors associated with the sparse population. These include freedom from many urban problems such as high crime rates and crowding and the continuing survival of family ranch operations.

TABLE 3-6

POPULATION CHARACTERISTICS

	1980 Population[1]	% Change Population 1970-1980[1]	Population Per Sq.Mi. 1980[1]	% Urban* Population 1980[2]	% Rural Population 1980[2]	% Farm** Population 1980[2]
State	652,695	5.6%	9.4	48.8	51.2	15.9
Adams	3,584	-6.5%	3.6	0.0	100.0	30.1
Billings	1,138	-5.0%	1.0	0.0	100.0	62.0
Bowman	4,229	8.4%	3.6	0.0	100.0	23.0
Dunn	4,627	-5.5%	2.3	0.0	100.0	48.3
Golden Valley	2,391	-8.4%	2.4	0.0	100.0	28.3
Grant	4,274	-14.7%	2.6	0.0	100.0	46.3
Hettinger	4,275	-15.8%	3.8	0.0	100.0	33.9
McKenzie	7,132	16.4%	2.6	0.0	100.0	30.5
Mercer	9,378	51.9%	9.0	31.0	69.0	16.2
Morton	25,177	24.0%	13.1	62.2	37.8	12.8
Oliver	2,495	7.5%	3.5	0.0	100.0	39.7
Sioux	3,620	-.03%	3.3	0.0	100.0	21.9
Slope	1,157	-22.0%	0.9	0.0	100.0	64.8
Stark	23,697	20.8%	18.0	67.2	32.8	11.2

*Urban population comprises all persons living in urbanized areas and in places of 2,500 inhabitants or more outside urbanized areas.

**Farm population is expressed as a percent of the rural population.

Sources:

1. U.S. Dept. of Commerce, Bureau of the Census, 1980 Census of Population and Housing, North Dakota, Final Population and Housing Unit Counts, PHC 80-V-36, 1981.
2. U.S. Dept. of Commerce, Bureau of the Census, 1980 Census of Population and Housing, North Dakota, Advance Estimates of Social, Economics and Housing Characteristics, PHC 80-S2-36, 1983.

TABLE 3-7

AFFECTED PERMITTEES AND DEPENDENCY

	Ranches in Category[1]			Dependency (number of ranches)[2]		
Ranch Size Category (cow units)	No.	Percent	Average Herd Size (cow units)	0-10% Total AUMs	Greater than 11% of Total AUMs	Average % Dependency
0—100	13	30	61	10	3	7.3
101—250	12	27	168	10	2	7.0
251—600	13	30	383	13		3.5
251—600[3]	3	7	400		3	34.6
More than 600	3	7	917	3		4.4

[1]Lists only those permittees having over 25 AUMs of BLM grazing.

[2]The dependency figures are an estimate of the percentage of the total AUMs for an eight month grazing season that are supplied by public land.

[3]Allotments with AMPs.

Source: BLM, 1983

TABLE 3-8

ESTIMATED CURRENT RANCH INCOME BY RANCH SIZE[1]

Ranch Size Category (cow units)	Number of Ranches in Category	Average Number of BLM AUMs per Ranch	Average Gross Livestock Sales per Ranch	Income Above Variable Costs per Ranch	Return to Family Labor & Investment per Ranch	Average Permit Value[2]
0—100	13	43	18,599	6,954	- 1,005	4,300
101—250	12	113	53,466	20,423	- 1,319	11,300
251—600	13	123	126,209	45,924	- 169	12,300
251—600[3]	3	1,329	126,209	51,065	4,972	132,900
More than 600	3	388	281,806	110,122	11,073	38,800

[1]Estimated Ranch Income does not include income from cash crops.
[2]Assumes a value of $100 per AUM.
[3]Allotments with AMPs.

Sources: BLM, 1983, USDA-ERS, 1983

TABLE 3-9

WEST RIVER RESOURCE AREA
EMPLOYMENT BY TYPE AND BROAD
INDUSTRIAL SOURCES
1974 and 1979[1]

Item	Employment		%
	1974	1979	Change
Proprietors			
Farm	8,880	8,624	-2.9
Non-Farm	3,018	3,681	22.0
Wage and Salary			
Farm	1,346	1,196	-11.1
Agricultural Services, Forestry, Fisheries and other	414	185	-55.3
Mining	724	2,414	233.4
Construction	1,803	3,944	197.7
Manufacturing	1,428	1,657	16.0
Transportation and Public Utilities	1,500	1,978	31.9
Wholesale Trade	1,350	1,769	31.0
Retail Trade	4,271	5,348	25.2
Finance, Insurance and Real Estate	650	991	52.5
Services	4,669	6,647	42.4
Government	7,408	6,509	-12.1
Total[2]	37,554	46,523	23.9

[1]West River River Resource Area includes Adams, Billings, Bowman, Dunn, Golden Valley, Grant, Hettinger, McKenzie, Mercer, Morton, Oliver, Sioux, Slope and Stark counties.

[2]Columns do not add to totals due to information not disclosed at the county level.

Source: Bureau of Economic Analysis, U.S. Department of Commerce, Regional Economic Information System, 1981.

TABLE 3-10

WEST RIVER RESOURCE AREA
PERSONAL INCOME BY MAJOR SOURCES
1974 and 1979 [1]

Item	Personal Income ($1,000)	
	1974	1979
Farm	167,098	80,239
Agricultural Services, Forestry, Fisheries and other	1,968	2,009
Mining	11,243	56,124
Construction	23,352	78,672
Manufacturing	15,572	26,426
Transportation and Public Utilities	19,733	42,171
Wholesale Trade	19,344	26,504
Retail Trade	29,250	45,651
Finance, Insurance, and Real Estate	5,925	16,504
Services	26,501	63,043
Government	38,342	66,740
Total[2]	360,468	532,393

[1]West River Resource Area includes Adams, Billings, Bowman, Dunn, Golden Valley, Grant, Hettinger, McKenzie, Mercer, Morton, Oliver, Sioux, Slope and Stark counties.

[2]Columns do not add up to totals due to information not disclosed at the county level.

Sources: Bureau of Economics Analysis, U.S. Department of Commerce, Regional Economic Information System, 1981.

TABLE 3-11

INDICATORS OF SOCIAL WELL-BEING

	% Population age 19 or less (1980)[1]	% Population age 65 or more (1980)[1]	% Population HS Graduates (1980)[1]	Median Family Income $ (1979)[1]	% Families with Income Below the Poverty Level (1979)[1]	Unemployment Rate (1980)[1]	% Housing Lacking Complete Plumbing (1980)[1]	Change in # of Farms and Ranches 1969-1978[2]	Change in Average Size Farms and Ranches 1969-1978[2]
State	33.5	12.3	66.4	18,024	9.8	5.3	4.8	-11.2	+ 9.8
Adams	31.1	16.3	67.9	16,271	13.4	2.2	6.2	-15.7	+13.7
Billings	37.1	8.5	61.3	22,241	14.8	1.9	11.2	+ 1.0	- 4.0
Bowman	35.2	13.5	67.0	17,342	10.5	2.0	3.2	- 1.0	+ 0.2
Dunn	36.0	11.2	58.1	14,271	16.1	2.9	7.3	- 8.9	+ 8.1
Golden Valley	34.2	16.1	68.2	17,818	11.1	1.3	7.5	+10.0	- 5.1
Grant	33.8	15.5	48.5	10,696	27.4	1.7	5.4	-14.7	+ 8.2
Hettinger	32.7	15.9	54.1	13,489	17.1	1.5	3.1	-17.3	+18.7
McKenzie	36.9	10.4	62.6	17,110	11.7	6.6	9.8	-11.2	-22.0
Mercer	33.9	9.1	57.4	20,703	8.1	4.6	3.3	-18.0	+ 5.6
Morton	36.4	10.8	60.2	18,798	8.6	7.0	2.8	- 9.9	+12.3
Oliver	27.4	8.4	54.4	18,618	13.1	5.2	11.0	-11.1	+ 2.3
Sioux	47.8	5.2	54.4	12,057	27.6	16.7	10.1	- 5.4	+ 1.8
Slope	36.2	11.3	63.6	13,606	19.3	0.4	12.4	+ 2.7	+ 1.7
Stark	36.3	9.8	63.2	19,222	9.0	2.0	2.1	- 9.1	+ 6.8

Sources:

[1]U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing, North Dakota, Advance Estimates of Social, Economic, and Housing Characteristics, PHC80-52-36, 1983.

[2]U.S. Department of Commerce, Bureau of the Census, 1974 and 1978 Census of Agriculture, North Dakota, State and County Data, 1977 and 1981.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE A: RANGELAND IMPROVEMENT

Vegetation

In the short term an additional 3,000 acres would be leased resulting in an increase of 750 AUMs for livestock use. Of the 14,580 acres currently unleased, these 3,000 acres represent the acreage suitable for livestock use. The additional 750 AUMs represent an 8% increase from current authorized livestock use.

In the long term an additional 733 AUMs would be available for livestock use. This increase would result from the improved grazing management primarily associated with the 3 existing AMPs and the 600 acres of contour furrowing. Totally a 1,483 AUM (15%) increase would be available for livestock use, considering both the short term (750) and long term (733) AUM increase. The increased level of livestock use (10,501 AUMs) would amount to approximately 25% of total annual vegetation production and allow sufficient vegetation for wildlife and non-consumptive uses (75%).

Improved grazing management would be centered on the AMPs where periodic monitoring and interdisciplinary evaluations would identify any needed modifications. Range improvement projects identified include: 600 acres of contour furrowing, 10 new reservoirs, 12 miles of fence modification, some pipeline construction and weed control. Where BLM is a very small part of the ranch, grazing authorizations would be coordinated with the lessees and future SCS ranch management plans. The results of this improved management would include increased forage production and improved ecological condition.

Control of leafy spurge is planned on 200 acres. The objective is to contain the spread of this agressive weed, which if left unchecked will reduce forage productivity and condition.

Conclusions

Under this alternative an additional 1,483 AUMs would be available for livestock use. This represents a 15% increase from the current grazing use authorization.

Some short term losses in vegetation production would be expected with the contour furrowing. The furrows themselves would be visible on the landscape for approximately 50 years and constitute a long-term irreversible commitment. In the long term, however, a many-fold increase in forage production would result from the contour furrowing.

Livestock

In the short term an additional 750 AUMs, resulting from leasing 3,000 unleased acres, would be available for livestock and would feed an additional 125 adult cattle for a 6-month grazing period. In the long term an additional 733 AUMs resulting from improved grazing management would feed an additional 122 adult cattle for a 6-month grazing period. Maintaining target stocking rates at the current level (25% of the available AUMs to livestock) would provide for sustained forage production and would also lead to higher livestock production.

Mechanical treatments would increase the forage base, but certain restrictions would be necessary to protect the treated area for two growing seasons. Livestock production would increase and distribution would improve because of treatments and improvements.

Water developments would be designed to accommodate both livestock and wildlife. Bird ramps would be required in stock tanks and some protective fencing around reservoirs may be needed. Twelve miles of fences would be modified to assure movement of wildlife.

Conclusion

Livestock production would increase and distribution would improve because of mechanical treatments and range improvements. There would be no irretrievable or irreversible loss of livestock resources in this alternative.

Watershed

Range improvement is expected to reduce sediment yields in the Big Gumbo area by about 10% and water yields by about 5% in the long term. While these changes would be noticeable in streams that drain the public land, this runoff would not significantly affect the quantity or quality of the Little Missouri River, due to the small amount of runoff compared to the size of the river. In the Lost Bridge area the change in sedimentation and runoff would be very small.

Improvements would be necessary in a very small percentage of the Big Gumbo area. Only 600 acres is suitable for mechanical treatment (Gifford, G.F. 1975; Neff, E.L. 1980; Neff and Wight 1977). There is some opportunity to achieve a better distribution of grazing pressure by adjusting livestock watering locations. New reservoirs would reduce sediment load and water yield (Branson, F.A., et al 1981).

In the Lost Bridge area there would be little potential for mechanical treatments but some opportunity for riparian area protection (e.g. fencing, alternate water sources, etc.). Poor distribution of grazing pressure in this area is due to topography and water distribution. Generally, the public lands are in upland positions with lighter grazing, while the better watered and more heavily grazed bottom lands are in private ownership.

The remainder of the public land in the state is scattered; thus, opportunities for improvements that would

alter the watershed characteristics are very limited. While changes may be noticeable at the improvement site, they would become negligible off tract because these parcels are so small in comparison to the watershed involved.

Soils

Rangeland improvement would have positive effects on the soil resource. Contour furrowing on about 600 acres of rangeland in Bowman County would initially expose the soil to potential wind and water erosion; however, infiltration would be improved, leading to increased soil moisture and greater vegetative cover than before treatment.

Development of new water sources where needed would result in better distribution of cattle, thereby reducing soil compaction and optimizing vegetative productivity over the whole area of a pasture. Erosional problems related to these areas of high cattle concentration would thus be diminished.

Increases in vegetative production as a result of improved management would provide additional residual vegetation and litter cover necessary for water protection. Increased cover and litter would promote water infiltration and reduce runoff and erosion. There would be no irretrievable or irreversible loss to the soil resource in this alternative.

Wildlife

With management aimed at optimizing rangeland management options for livestock, wildlife, and watershed, local populations of wildlife would be benefited and possibly increased. Such increases cannot be quantified, because they would be conditional upon each allotment's characteristics, wildlife species present, and the activities on neighboring lands.

Livestock and wildlife management can be compatible. Compatibility would be maintained by identifying and resolving conflicts at the allotment level. Specific actions cannot be discussed in a general document such as this EIS because of differences in: 1) soils, topography, and vegetation of individual allotments; 2) operation of those allotments; and 3) distribution, density, seasonal use, and species composition of wildlife occurring on the allotments. Consequently, discussions of impacts here will be general, with specifics referred to management plans and management level.

Although the majority of the public lands managed by BLM in the EIS area has been classified in good to excellent range condition, specific wildlife habitat conditions have not been fully classified. Consequently, monitoring of allotments would be designed to evaluate trend and utilization of wildlife habitats. Based on the results of monitoring, there would be adjustments in allocations of vegetation or grazing systems or additions of rangeland developments (e.g. fencing, water source development) to maintain or improve crucial habitats or specific habitat needs.

Developments in crucial habitats would be carefully evaluated and, if necessary, relocated to protect wildlife values (e.g., minimize placement of livestock water and salt sources in riparian and hardwood draw habitats).

Development of new water sources would make available more habitat and enhance productivity of wildlife (Trapp, 1980). New reservoirs constructed would have incorporated in their design considerations for waterfowl nesting and shorebird use. Shoreline vegetation would be monitored to ensure adequate cover for wildlife is available and appropriate management actions are implemented (e.g., fencing and adjustments in livestock use periods). Existing reservoirs would be evaluated for potential for improvement for wildlife and improvements made. Land treatments would include wildlife considerations. Interseeding and contour plowing would include in the seed mix forbs and shrubs beneficial to wildlife. AMPs would be revised as necesary to ensure that adequate cover is available for wildlife and to help maintain the desired vegetative communities for wildlife as well as livestock. The remaining allotments would be evaluated and management implemented where necessary.

This would include fencing wetlands in the East River Resource Area to encourage dense nesting cover for waterfowl, development of water sources to improve livestock distribution and relieve concentrations of livestock in crucial wildlife habitat where monitoring shows it occurs, and cooperative management efforts with livestock operators to encourage grazing systems and seasons of use compatible with wildlife needs. Funding for implementation of management could be shared by both range and wildlife programs to ensure adequate measures are taken for both resources.

Conclusions

The effect of Altemative A on wildlife populations would be dependent upon the levels and types of grazing practices proposed. Overall, wildlife habitats would remain at current or improved condition levels. Crucial habitats would be improved. Monitoring would determine if wildlife habitats are deteriorating and if crucial habitats are improving. Livestock use would moderately limit the capability of public lands to provide additional wildlife habitat demand caused by conversion of private rangelands to intensive farming use.

In the long term, wildlife habitat conditions would be improved on 38,000 acres as a result of improved grazing management and made capable of supporting increased populations, providing that adjacent private land use does not negate management practices on BLM lands (e.g. loss or destruction of adjacent, complimentary habitat by conversion to cropland or heavy

grazing). Increased forage would contribute to better physical condition of wildlife species. There would be no irretrievable or irreversible impacts.

Cultural Resources

The environmental consequences of livestock grazing in the proposed action or in any of the alternative actions are difficult, if not impossible, to identify. Neither the archaeological nor the management literature provides any supportable documentation of the effects of livestock grazing on cultural resources. Artifact breakage and displacement has been suggested as an effect of livestock trampling; however, there is no data to support or refute this suggestion. Cultural resources would be affected, however, when the effects of range management and the location of a cultural resource coincide.

The informational potential of cultural resources can be adversely affected by any action that would necessitate the removal or redistribution of significant amounts of soil, such as during the construction of range developments. Because the integrity of these resources depends on the preservation of the objects and features used by humans and the preservation of their context (position relative to one another), any soil disturbance could destroy this arrangement and make the site meaningless. Paradoxically, it is the removal of soil (through erosion or disturbance) that allows for the discovery of some of the most important cultural resources. Also, increased vegetation and stabilized or aggrading conditions could hide sites and remove them from possible study.

Although not quantifiable, adverse impacts could be expected to occur on some cultural resources as a result of construction of range developments. Most adverse impacts can generally be avoided through project redesign. However, it is unlikely that the proposed action or any alternative would avoid all the cultural resources in the study area. Therefore, it is possible that some unavoidable impacts would occur.

Appendix C details the procedures to be used to inventory areas disturbed by range developments and describes the evaluation and consultation to be done with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) to mitigate impacts that are unavoidable.

Inventory and assessment of cultural resources directly affected by range developments would provide immediate gains in scientific knowledge of the area and a data base for long-term gains. Long-term loss of scientific data could occur if an inventory did not discover a site that was subsequently destroyed during construction. Also, in cases where salvage mitigation is required, the techniques used to collect information would generally destroy the future potential of the resource. Cultural resources are nonrenewable, and once they are used or destroyed, they are not available for future use.

Conclusions

As stated above, the proposed action or any alternative could have both beneficial and adverse effects on cultural resources. The range improvement alternative would have the greatest direct impact on cultural resources because of the greater acreage of ground disturbance.

Gains in scientific knowledge of the area should occur. Salvage excavation or inadvertent destruction of sites would be irretrievable resource commitments, because no further information beyond what was collected before destruction could be obtained in the future. Unavoidable adverse impacts would be irreversible and would result in the permanent loss of some of the information potential of the study area; however, because most cultural resources can be avoided, and salvage mitigation can preserve a large measure of the information contained in adversely impacted sites, irretrievable commitments of resources would be within acceptable limits.

Recreation

It is difficult to predict how this alternative would affect the major recreation use, hunting. Where game populations increase, better hunting opportunities may be provided; however, legal and physical access remains an obstacle on most lands and hunter use is not expected to increase significantly. Generally, livestock use on BLM lands does not adversely affect recreation to any great degree. There would be no irretrievable or irreversible impacts to recreation.

Social Impacts

The social well-being of the families dependent upon the three affected ranches would be improved in the long term because of increases in income and permit value. It is assumed that the attitudes of the affected ranchers toward the plan would be positive.

Economic Impacts

There would be no short-term changes in net annual ranch incomes with this alternative.

In the long term, there would be increases in net annual ranch incomes. Increases in BLM AUMs are projected to occur only on AMP allotments. Tables 7 and 8 of Appendix B show the long-term impacts to representative ranch operations. The average increase in AUMs is 14 percent or about a 4 percent increase in total ranch forage. The average increase in net annual income would be $1,800, an increase of 37 percent. The total increase in net annual income to all affected ranch

operations would be $5,400. Total permit values would increase by $55,200.

There are no quantifiable impacts on game populations under this alternative. As such, there are no quantifiable changes in hunter use or expenditures and no economic impacts.

In the short term, the increase in range development expenditures would be insignificant to the regional economy. Livestock sales would not change in the short term with this alternative.

In the long term, the increase in livestock sales would be $11,000. This would be an insignificant impact to the regional economy.

ALTERNATIVE B: NO ACTION

Vegetation

The current stocking rates would remain at their present level and management would continue at the custodial level. Range that is in an unsatisfactory condition would probably remain the same or decline.

The current grazing systems would be maintained. No revisions could be made to correct problems. Current trends would be expected to continue in the short term but might decline in the long term, since there is no opportunity to make changes in response to problems. Concentration areas would continue to be heavily grazed season long.

Sites suitable for mechanical treatments and soils responsive to grazing treatments would continue to produce at levels below their potential. Leafy spurge and other noxious weeds would spread and reduce range condition on the infested areas.

Maintenance of current stocking levels and seasons of use without control of noxious weeds would result in reduced forage supplies, overuse and deteriorated range condition.

Conclusions

This alternative would result in general maintenance of present trends and ecological range conditions in the short term; however, without monitoring and some degree of supervision, there is no guarantee that this would be true for the long term.

Leafy spurge would continue to increase, causing a reduction in range condition and forage production. The loss of vegetative production by lower ecological range conditions would be irretrievable but not irreversible.

Livestock

Current stocking levels would not change in the short term or long term in this alternative, but there is potential for reduced forage production on allotments with range condition in less than good condition and those with uncontrolled noxious weeds.

The loss of forage would probably be quite noticeable on some allotments and minor on others. For example, those allotments which are stocked at lighter levels and have good range condition would be only slightly affected, while an allotment with less range in good condition would lose production. Those allotments with noxious weeds or prairie dogs would be most affected.

There would be no change in seasons of use, grazing, or land treatments in response to depleted forage supplies. Less than desirable livestock distribution would continue where it presently exists and would contribute to lower animal production, especially under heavy grazing.

Conclusions

Production would remain static during the short term, but may decline in the long term because of the lack of improved grazing management and the spread of noxious weeds.

Watershed

This action would cause no discernable change in the water quality and quantity characteristics as they are described in the present situation. There is no data that shows what the trend in this area is at present, but early indications are that it is very slowly improving.

Soils

Without the option to make changes or adjustments in grazing treatments, stocking rates, and seasons of use, watershed conditions could deteriorate in the long term. Accelerated erosion would decrease soil productivity and fertility, further reducing management options.

Wildlife

This alternative would cause no short-term discernable change in wildlife habitat characteristics as they are described in the present situation. In the long term, without the opportunities for vegetation manipulations, additional water facilities, adjustments in grazing systems, and cooperative management, some species of wildlife would be restricted from full utilization of potential habitat. Livestock concentrations on crucial wildlife habitat could be significantly competitive with wildlife, particularly during the spring and winter seasons.

Conflicts between livestock and big game, although limited at present, would remain and would increase in the long term. Conflicts would tend to cause a decline in the condition and availability of the vegetative resource (e.g. reduction of cover and/or forage).

Because of the freeze on developments, livestock impacts would remain concentrated on areas with water and highest vegetative production. In turn, some prime wildlife habitats, (e.g., riparian, hardwood draw. shoreline vegetation) could be heavily impacted by livestock concentrations. No additional residual cover would be available for upland game, waterfowl, and other species.

Conclusions

Wildlife habitats would continue as they are currently trending. Without the capabilities to manage livestock use (water dispersion, fencing, etc.), livestock concentrations could cause local deterioration of habitats. Hardwood draws, reservoir sites, wetlands, and riparian areas would probably be the most likely affected habitats because of their water elements and shelter.

Without the capability to effect management changes, opportunities to enhance wildlife habitat would be limited or lost.

Cultural Resources

Under Alternative B, no new range improvements would be undertaken, but grazing would still be allowed. Maintenance of old projects would continue, but most would occur within the boundaries of a previously inventoried area. Without the opportunity to correct erosion, cultural materials in highly erosive areas could be horizontally and/or vertically displaced. Generally, with no new range developments, the lower acreage experiencing ground disturbance would translate to fewer direct impacts on cultural resources. Any ground disturbing projects implemented would require the process explained in Appendix C, and would have environmental consequences similar to the analysis in Alternative A, although at a lower cumulative level.

Recreation

This alternative would cause no discernable change in recreation opportunities as they are described in the present situation. There are no irretrievable or irreversible effects on recreation.

Social Impacts

This alternative would maintain the current situation; therefore, there would be no social impacts due to its selection.

Economic Impacts

Since this alternative would maintain the current situation, there would be no short- or long-term impacts to the local or regional economy, as described in the Affected Environment chapter.

ALTERNATIVE C: REDUCED LIVESTOCK USE

Vegetation

Initially AUM target figures for livestock would be at a lower level (7,800 AUMs, 20% of vegetation production). There would be a slight increase in vegetation in the long term. As vegetative productivity increases because of reduced grazing, AUMs for livestock use would be gradually increased but not to original levels.

Long-term projections are based on an increase in forage production primarily on AMP allotments. A continuation of present trend and benefits of mechanical treatments will result in a 20% increase in forage production. Total forage increase would amount to 2,932 AUMs (587 to livestock and 2,345 wildlife and nonconsumptive uses).

Management and range improvement inputs would be the same as Alternative A. Lower stocking rates would accelerate the rate of improvement.

Conclusions

Grazing systems, lighter stocking levels, and land treatments would improve the ecological range condition on the AMP and other allotments. Plant vigor, litter cover, and water infiltration would improve resulting in a significant increase in forage production.

The long-term livestock vegetation use is estimated at 8,987 AUMs or 8% below the present 9,751 AUMs; nonconsumptive and wildlife AUMs would increase 15% over what is currently available.

Ecological range condition would improve significantly.

There would be no irretrievable or irreversible loss of vegetation resources in this alternative.

Livestock

This alternative would reduce current livestock AUMs by 20% (1,351 AUMs). The loss of grazing would have a negative impact on livestock in the AMP allotments.

Implementation would be very costly in terms of fencing and additional water sources needed. Management would be made very difficult by reduction of pasture size, stock traps created by enclosure fences, and odd-shaped pastures.

Although there would be some long-term increase in livestock AUM allocation (from the initial reduced level) because of improved productivity, there would not be a return to original stocking levels.

Conclusions

Livestock numbers would decline as a result of losing 1,351 AUMs in the short term and 764 AUMs in the long term. There would be an irretrievable reduction in permitted AUMs in this alternative but this would not be irreversible.

Watershed

Reduced livestock grazing would reduce sediment yields in the Big Gumbo area by approximately 12% and water yields by approximately 6%. In the Lost Bridge area and on the scattered tracts, the change in sedimentation and runoff would be insignificant.

The results of this alternative would be similar to that for Alternative A, but they would include the effects of even less grazing pressure. Reducing the grazing would increase the amount of watershed cover and litter. This would decrease sediment production and slow runoff. It would take a very long time to produce these changes that are in addition to those associated with Alternative A.

While these changes would be noticeable in streams that drain the public land, this runoff would not significantly affect the quantity or quality of the Little Missouri River because of the small amount of runoff compared to the size of the river.

Soils

This alternative would have essentially the same long-term effect on the watershed as Alternative A, except that grazing treatments and AMP objectives would be governed to meet the resource objectives of deferring grazing on floodplains and erodible areas during April-June and eliminating grazing on crucial wildlife winter range and riparian areas. Because of these actions there would be about 1,351 less AUMs targeted for livestock use in Alternative C than in Alternative A. This loss in AUMs would mean less cattle trampling, soil compaction, and streambank sloughing, and greater vegetative cover.

There would be no irretrievable or irreversible loss of the soil resource in this alternative.

Wildlife

Vegetation targeted for wildlife and nonconsumptive uses would be increased, resulting in increased residual cover available for wildlife. Rangeland improvements and management would not be carried forth as intensively as in Alternative A, except for projects in the AMPs, thereby reducing the benefits that would be available to wildlife on the other allotments. Big game would benefit from reduced competition for forage, and moderate population increases could occur locally in the long term. Areawide, populations of big game would not be significantly affected. Fencing of reservoirs would result in an increase in vegetative cover beneficial to waterfowl and other wildlife. Hardwood draws and riparian areas would be treated as needed to improve their condition. Possible treatments include changes in grazing systems and/or seasons, improved water distribution and fencing. Most treatments on non-AMP allotments would be primarily for wildlife and would not have the full benefit of cost-sharing from other activities. Cooperative management with operators may be difficult to obtain where they do not receive tangible benefits. Exclusion of grazing on crucial wildlife habitat and riparian areas would result in accelerated improvement of these habitats in the short term.

Conclusions

The effect of Alternative C on wildlife populations would be beneficial. Overall, wildlife habitats would remain at current or slightly improved condition levels. Crucial habitats would experience accelerated improvement in the short term. Certain resultant successional changes (i.e., reversion of shrub ranges back to grasses) may not provide optimum big game forage production.

Unique to this alternative would be the proposal to allocate 100% of the vegetation on crucial habitat to wildlife. Included in this category is the proposal to fence existing and future reservoirs to promote cover for nesting waterfowl and other wildlife.

Monitoring would be relied upon heavily to ensure that wildlife habitat objectives are met. In the short term, local wildlife numbers would probably increase. In the long term, overall wildlife numbers could average higher than now occurs.

There would be no short-term or long-term irretrievable or irreversible adverse impacts to wildlife populations.

Cultural Resources

Under Alternative C, restricted livestock use should improve range conditions. The fencing, water improvements and mechanical treatments associated with enhancing wildlife values, however, all cause varying degrees of ground disturbance. Again, as in Alternatives A and B, ground disturbing projects would be subjected to the cultural resource protection process outlined in Appendix C. Similar benefits and impacts as in Alternative A could be expected to occur. The improved watershed values and wildlife habitat would increase vegetative ground cover and reduce erosion. This could be beneficial to cultural resources by reduc-

ing exposure of artifacts if livestock trampling was proved to affect cultural resources.

Recreation

It is difficult to predict how this alternative would affect the major recreational use, hunting. If game populations increase, better hunting opportunities may be provided; however, legal access remains an obstacle and hunter use is not expected to increase.

Social Impacts

The social well-being of the families dependent upon the 44 affected ranches would be negatively impacted in the short and long terms due to losses in income and permit value. The three operations with AMP allotments and a much higher dependency on BLM AUMs would be affected more severely than the remaining operations with fewer BLM AUMs. The attitudes of affected ranchers would be expected to be negative toward the BLM and the plan.

Economic Impacts

There would be short- and long-term decreases in net annual ranch incomes with this alternative.

Tables 6, 7, and 8 of Appendix B show the short- and long-term impacts to ranch operations by representative size category.

The average short-term decrease in BLM AUMs is 20 percent, or about a six percent decrease in total ranch forage for operations with AMP allotments and a one percent decrease for other ranch operations. The average decrease in net annual income for the representative livestock categories ranges from $90 for small livestock operations to $2,750 for operations with AMP allotments. Total short-term decreases in net annual income to all affected ranch operations would be $17,200.

The average long-term decrease in BLM AUMs is six percent for operations with AMP allotments and 20 percent for other ranch operations. The average decrease in net annual income for the representative livestock categories ranges from $90 for small livestock operations to $760 for operations with AMP allotments. Total long-term decreases in net annual income to all affected ranch operations would be $11,250.

Total permit values would decrease by $177,400 in the short term and $118,900 in the long term. These decreases in permit value would have a negative effect on ranchers' borrowing capacity and ranch sale value.

There are no quantifiable impacts on game populations under this alternative; therefore, quantifiable changes in hunter use and expenditures and resulting economic impacts cannot be predicted.

In the short term, the decrease in livestock sales would be $31,000 as a result of the decrease in AUMs. The long-term decrease in livestock sales would be $19,000, a lesser amount than the short-term impact because of increased AUMs resulting from increased forage production. This would be an insignificant impact to the regional economy.

ALTERNATIVE D: NO GRAZING

Vegetation

Eliminating livestock grazing would bring about an initial rapid improvement in plant vigor and vegetation cover in the short term. In the long term, removal of the growth stimulus provided by moderate grazing, vigor and production would eventually decline (Weaver and Rowland 1952; Reardon and Merrill 1976). Decadent stands of grasses and shrubs that would develop are essentially unusable, or at least less desirable to wildlife herbivores. Reardon and Merrill (1976) found that, at the end of 20 years, decreaser plant forage yields and litter accumulations were lower on ungrazed natural areas than under deferred rotation and light grazing. They suggested that decreaser plants to need some type of grazing in order to remain vigorous and productive. Further, long periods of complete rest are not usually an economical form of range rehabilitation (McLean and Tisdale 1972).

Some range sites would improve very slowly (because of soils or moisture limitations), but eventually they would trend towards but never reach climax. Those ranges in excellent condition now would remain in excellent condition in the short term, then decrease in production and vigor in the long term. Without the stimulation of grazing, plant vigor and production would level off and stagnate on most soils in the long term.

About 650 miles of fences would be needed to exclude livestock from public lands. Impacts common to construction and maintenance of fences to include construction of road and trails would result. Livestock trailing along the fences could impact private and state lands, assuming ranchers continue to graze livestock on their lands.

Noxious weed control efforts to control leafy spurge would be included in this alternative.

Conclusions

Ecological range condition of most range lands would improve in the short term. Plant vigor and vegetation cover would increase but would then level off and stagnate. Fences required to exclude grazing would affect vegetation slightly.

The loss of vegetative production from stand stagnation would be irretrievable but not irreversible.

Livestock

The elimination of livestock grazing on public land would cause a loss of livestock production on ranches associated with public land grazing. This would amount to a loss of 9,751 AUMs.

The loss of grazing would reduce animal productivity on private and state lands, too, as livestock would have to trail to make use of the scattered private and state holdings. Livestock would be excluded from water, forage, and shade areas on public lands and would trail along fence lines.

Conclusions

This alternative would eliminate stock use of the public lands. Livestock stress on non-public lands would increase and result in reduced productivity.

There would be a total irretrievable loss of permitted AUMs in this alternative but this would not be irreversible.

Watershed

This alternative would reduce sediment yields in the Big Gumbo area by about 5% and water yields by an insignificant amount. In the Lost Bridge area, it is expected that sedimentation would be reduced some. On the scattered tracts, the change in sedimentation and water yield would be insignificant.

The results of this alternative would be an increase in the amount of cover that protects the soil surface. This increase would not be large because of the good range condition in most of the Big Gumbo area. In the Lost Bridge area some small areas near stream channels would eventually have large increases in cover. These small area contributions, when accumulated, would result in a smaller decrease in sediment overall for the entire Lost Bridge area.

While these changes would be noticeable in streams that drain the public land, this runoff would not significantly affect the quantity or quality of the Little Missouri River because of the small amount of runoff compared to the size of the river.

The reduction of sediment yields due to the increased cover would not be as dramatic over the whole Lost Bridge area because of the small size of the areas with improved cover conditions.

Soils

Elimination of livestock grazing on public lands would bring about an immediate increase in vegetative residue and carryover, providing more cover and litter to the soil surface. An increase in soil productivity and development would occur, with an increase in levels of organic matter and increased soil moisture. There would be no irretrievable or irreversible loss of the soil resource in this alternative.

Wildlife

In the short term, absence of grazing would result in an increase of forage and cover. Residual vegetation on all allotments would provide cover and food for additional upland game. Shoreline vegetation would improve, providing good nesting cover for waterfowl. Riparian and hardwood draw habitats would improve in the absence of livestock grazing.

Livestock reservoirs with high to moderate waterfowl use potential would be maintained. Additional wetlands would be maintained. Additional wetlands for waterfowl would be developed in moderate to high potential use areas as funding and maintenance capabilities allow.

Without the need for division fencing on public lands in the AMPs, removal of such fences would improve big game movements. However, increased fencing to accommodate more intensive livestock management on private lands would offset the benefits of removing pasture fences on public lands. Fences necessary to keep livestock off scattered tracts of public land could significantly impair big game movements.

Vegetation succession would proceed past the more productive disclimax stages and be less favorable for wildlife.

Conclusions

All wildlife habitats would improve dramatically in the short term. In the long term, certain resultant successional changes (e.g., reversion of shrub ranges back to grasses) may not provide optimum big game forage production.

In the short term, wildlife numbers would increase. In the long term, overall wildlife numbers could average higher than at present but considerably below the levels possible when grazing is designed to meet wildlife needs (see Alternative A, Rangeland Improvement). Cycle fluctuations above and below the long-term average will still occur.

There would be no short-term or long-term irretrievable or irreversible adverse impacts to wildlife populations.

Cultural Resources

If grazing is not allowed under Alternative D, no range projects or maintenance of existing range improvements would be necessary. In this case, cultural resources would not be impacted by ground disturbance from BLM initiated projects.

Without grazing, the watershed and range conditions should improve, thus reducing erosion. Similar to Alternative C, this could be beneficial to cultural resources.

Recreation

It is difficult to predict how this alternative would affect the major recreational use, hunting. If game populations increase, better hunting opportunities may be provided; however legal access remains an obstacle and hunter use is not expected to increase.

Social Impacts

The social well-being of the families dependent upon the 44 affected ranches would be negatively impacted in the short and long terms due to losses in income and permit value. The 3 operations with AMP allotments and a much higher dependency on BLM AUMs would be severely affected due to the loss of all BLM AUMs. The attitudes of affected ranchers would probably be extremely negative toward the BLM and the plan.

Economic Impacts

In this alternative, all grazing on BLM lands would be eliminated in the short and long term on all allotments. The average dependency for operations with AMP allotments is 35 percent and 5 percent for other operations. The average decrease in net annual income for the representative livestock categories ranges from $430 for small livestock operations to $12,900 for operations with AMP allotments. Total short-and long-term decreases in net annual income to all affected ranch operations would be $85,000. Tables 6, 7, and 8 of Appendix B show the impact to representative ranch operations.

Total permit values would decrease by $866,500 in the short and long term. These decreases in permit values could have a negative effect on ranchers' borrowing capacity and ranch sale value.

There are no quantifiable impacts on game populations under this alternative. As such, there are no quantifiable changes in hunter use, expenditures, nor economic impacts.

Appendix D describes the method used to analyze the impact on output, earnings, and employment due to changes in livestock sales and range development construction.

In the short and long term, the greatest impact would be from decreases generated by a loss in livestock sales. The annual loss in livestock sales would be $165,800. Gross business value would decrease by $744,900 annually. These changes would result in a loss of $173,400 annually in earnings and less than 10 in employment. In the short term, this would be offset by the increase in the construction sector with range development expenditures. In the long term, these changes would be insignificant to the regional economy.

CHAPTER 5
CONSULTATION AND COORDINATION

The North Dakota Grazing Environmental Impact Statement was prepared by specialists from the BLM's Dickinson District Office with assistance from BLM's Montana State Office. Disciplines and skills used to develop this EIS were: vegetation and rangeland use, animal husbandry, recreation, climate, sociology, economics, geology, hydrology, soils, cultural resources, wildlife, fisheries, graphics, editing, public affairs and typing. Writing of the EIS began in July 1983 following a complex planning and data gathering process. The process included inventories of resources, public participation, coordination with other agencies, and a planning effort. Consultation and coordination with agencies, organizations and individuals occurred throughout the process.

PUBLIC INVOLVEMENT AND CONSULTATION DURING DEVELOPMENT OF THE EIS

The public participation process that was conducted during the development of this EIS included public informational meetings on July 25, 1983 in Watford City and Williston; July 27, 1983 in Bowman; and July 28, 1983 in Mott. An informational and scoping brochure inviting public comment was mailed out in a mass mailing on July 20, 1983. Additionally, a questionnaire requesting additional information and comments was sent to all grazing lessees in the District. From this procedure, an alternative was designated as the "preferred" alternative, namely, Range Improvement.

Informal consultation with the North Dakota State Historical Preservation Office (SHPO), the U.S. Fish and Wildlife Service and North Dakota State Game and Fish Department took place. These agencies will have an opportunity to review the EIS.

OTHER AGENCIES AND ORGANIZATIONS CONSULTED

The North Dakota EIS team consulted and/or received comments from the following during the preparation of the EIS:

Federal Agencies

Soil Conservation Service
Fish and Wildlife Service
Bureau of Reclamation
U.S. Geological Survey
U.S.D.A. Agricultural Stabilization and Conservation Service
U.S. Forest Service

State Agencies and Organizations

North Dakota State Game and Fish Department
North Dakota State Land Department
North Dakota State University Agricultural Experiment Station
North Dakota State Agriculture Department
State Historical Society of North Dakota
North Dakota State Parks and Recreation Department

County Commissioners and Planning Boards

Adams County
Barnes County
Benson County
Billings County
Bowman County
Burleigh County Cavalier County
Divide County
Dunn County
Eddy County
Emmons County
Golden Valley County
Grand Forks County
Grant County
Kidder County
Logan County
McHenry County
McIntosh County
McKenzie County
McLean County
Mercer County
Morton County
Mountrail County
Oliver County
Pierce County
Renville County
Sheridan County
Stutsman County
Walsh County
Ward County
Williams County

Special Interest Groups

Natural Resources Defense Council
North Dakota Chapter of the Wildlife Society

Further comments are expected during the public review period scheduled for January 1984. Copies of the EIS were mailed to all affected livestock operators, public interest groups and related government entities. Copies also will be available for public review at the BLM office in Dickinson and upon request.

COMMENTS REQUESTED

Copies of the EIS have been sent to and comments on the EIS have been requested from the following agencies, organizations and interest groups.

Federal Agencies

Advisory Council on Historic Preservation
Soil Conservation Service
U.S. Forest Service
U.S.D.A. Agricultural Stabilization and Conservation Service
Department of Defense
U.S. Army Corps of Engineers
Department of Commerce
Department of the Interior
Bureau of Indian Affairs
Bureau of Mines
Fish and Wildlife Service
Geological Survey
Bureau of Reclamation
National Park Service
Environmental Protection Agency
Council of Environmental Quality

County Commissioners and Planning Boards

Adams County
Barnes County
Benson County
Billings County
Bowman County
Burleigh County
Cavalier County
Divide County
Dunn County
Eddy County
Emmons County
Golden Valley County
Grand Forks County
Grant County
Kidder County
Logan County
McHenry County
McIntosh County
McKenzie County
McLean County
Mercer County
Morton County
Mountrail County
Oliver County
Pierce County
Renville County
Sheridan County
Stutsman County
Walsh County
Ward County
Williams County

Congressional Offices

Office of Congressman Byron Dorgan
Office of Senator Mark Andrews
Office of Senator Quentin Burdick

State Agencies

North Dakota State Game and Fish Department
North Dakota State Land Department
North Dakota Department of Agriculture
North Dakota Department of Health
North Dakota Stockmans Association
North Dakota Association of Soil Conservation Districts
North Dakota Water Commission
North Dakota Governor's Office
North Dakota State University
North Dakota State University Cooperative Extension Service
North Dakota State Historic Preservation Office
Roosevelt-Custer Regional Council for Development
North Dakota State Parks and Recreation Department

Other Organizations

Audubon Society
Friends of the Earth
Isaak Walton League
Sierra Club
Badlands Trail Riders
Badlands Environmental Association
N.D. Natural Science Society
N.D. Wildlife Federation, Inc.
Northern Plains Resource Council
Wildlife Society
Society for Range Management
Wildlife Management Institute
Ducks Unlimited
Natural Resources Defense Council
Dakota Resources Council
North Dakota Chapter of the Wildlife Society
Nature Conservancy
Defenders of Wildlife
American Fisheries Society
National Wildlife Federation

LIST OF PREPARERS

The following people wrote this EIS.

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BS Resource Management (Soils), University of Wisconsin, Stevens Point. Don has worked six years for the BLM and 2½ years for BIA. He wrote the soils portion of the EIS.

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BA Psychology, Miami (Ohio) University. Joan wrote the social sections and portions of the ranch economic conditions. She has worked for BLM for four years.

Jerry Majerus: State Office Economist

BS Forestry, University of Montana; MS Forestry, University of Montana. Jerry wrote portions of the ranch economic conditions and wrote the ranch impacts, regional economic impacts and economic conditions. He has worked for BLM for one year.

Mel Ingeroi: Public Affairs Specialist

BA English, Dickinson State College; MA English, Pittsburgh State University. Mel has worked 4½ years for BLM and 2½ years with the Fish and Wildlife Service. Mel reviewed and edited the EIS.

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BS Wildlife, University of Montana; graduate work in range science at Montana State University. Duane prepared portions of the vegetation and livestock sections and provided technical review of the EIS. He has worked for BLM eighteen years.

Gary Lipp: Natural Resources Specialist

BA Social Science, Concordia College; MS Community and Regional Planning, North Dakota State University; Doctorate work in Natural Resource Management, North Dakota State University. Gary worked one year for the Upper Missouri River Basin Commission and 2½ years at the BLM Dickinson District Office. He provided technical review for portions of the EIS.

Burton D. Williams: Archaeologist

BA Anthropology, University of Montana; four years graduate study in Anthropology and Archaeology, University of Colorado. Burt has been with the BLM for eight years in the Montana State Office. Burt reviewed the document for compliance with cultural resource regulatory requirements and Bureau policies and wrote portions of the cultural resources sections.

Larry Pointer: State Office Planning Coordinator

AA Botany, Sheridan College, Wyoming; BS Genetics, Iowa State University; MS Agronomy and Plant Genetics, University of Minnesota; MA Librarianship/Archives Speciality, University of Denver. Larry has had extensive experience in preparing and reviewing EISs since 1975 when he joined the BLM. He provided State Office coordination and review of the document.

Gary Roam: State Office Environmental Coordinator

BS Forestry, University of Minnesota; MA Public Administration, University of Oklahoma. Gary provided State Office coordination and review of the EIS. He has worked sixteen years for BLM.

APPENDIX A

ALTERNATIVE IMPLEMENTATION COSTS

Improvement Costs	Alternatives			
	A	B	C	D
Fences	0	0	0	1,495,000
Fence Modification	12,000	0	32,000	
Mechanical Treatment	18,000	0	18,000	
Leafy Spurge Control	100,000	0	100,000	
Water Developments	30,000	0	30,000	0
TOTAL	160,000	0	192,000	1,495,000

*Costs are figured at the following rates:

Fence Construction	-	$ 2,300/mi
Fence Modification	-	1,000/mi
Mechanical Treatment	-	30/mi
Leafy Spurge Control	-	500/mi
Water Development	-	3,000/mi

APPENDIX B

METHODOLOGY FOR ASSESSING RANCH RELATED ECONOMIC IMPACTS

The impact analysis examines the situation involving the relative economic aspects of increases or decreases in BLM AUMs on ranch operations. It is important to note that there exists variation in costs and revenues to agricultural operations. For that reason, values used are representative of operations in this area and in no way are these figures meant to represent a particular operation. Instead, they are intended to provide the reader with a general understanding of costs and revenues associated with generic agricultural operations.

There are a total of 97 individual ranch operations with BLM grazing privileges in North Dakota. Fifty-three of these 97 ranches have 25 or fewer BLM AUMs. These AUMs are virtually unimportant to ranches so the analysis concentrates on the 44 remaining ranch operations.

Through the use of BLM grazing records and Dickinson District BLM employees expertise, the 44 ranches were placed in five size categories (Table 3-7). The predominate type of ranch is a cow/calf operation. Many of the operations also produce cash crops, primarily wheat. This analysis will concentrate on the livestock portion of the ranch operation.

To determine dependency of ranches on public grazing, the total AUM grazing requirement for the ranches was computed.

This was accomplished by multiplying eight times the total estimated number of animal units (AUs) for each ranch. Eight was used because it is estimated that, on the average, ranch operations in the study area graze eight months and feed hay and supplement the other four months. To determine the percentage of dependency of each operation on public grazing, the number of BLM AUMs permitted was divided by the total ranch AUM requirement. Table 3-4 summarizes these dependencies.

The number of livestock on ranches within each size category was averaged. Results indicate the following: 0-100 cows, average 61 cows; 101-250, average 168 cows; 251-600 cows, average 400 cows and 601 plus cows, average 917.

Ranch budgets were constructed for each of the representative size ranches. These budgets were developed using current beef cow enterprise budgets from the Economics and Research Service (USDA,ERS) and information gathered by BLM regarding such production items as calf crops, forage requirements, herd size, etc. Prices are three-year averages for the time period 1980 through 1982. Tables A-1 through A-5 summarize the representative livestock budgets.

A linear programming model was developed by BLM to maximize ranch income based on a series of production parameters and constraints. To determine the economic impacts on the ranch, the level of public grazing was varied (increased, decreased, or eliminated) according to the proposed change in BLM AUMs under each alternative.

For example, under the no grazing alternative, 100 percent of the public AUMs are eliminated from the representative ranch.

It is very difficult to project how ranchers would adjust their operations given a change in BLM AUMs. Each ranch operation is unique, and the adjustment by each rancher to a change in AUMs would probably vary somewhat. It was assumed that the most likely response of ranchers to decrease in AUMs would be to reduce the size of the ranch operation. Small ranches would probably be less likely to reduce the size of their operations and would probably purchase hay, for example, to compensate for the loss of public grazing. If BLM increased the number of AUMs, ranchers would not necessarily increase the size of their cow/calf operations. They might, for example, reallocate grazing in spring and fall to public pastures, so that less winter feed must be purchased.

Using the Linear programming model, then, the change in ranch income was calculated given a change in AUMs. Private lands are intermingled with public lands, so a reduction in public grazing can cause a reduction in private grazing. However, in the calculations, grazing on private lands is not reduced.

Tables B-6, B-7, and B-8 summarize the changes in BLM AUMs and ranch income under the various alternatives.

TABLE B-1

REPRESENTATIVE RANCH BUDGET - HERD SIZE 60

1. Production

Sales:	Unit	Number	Average Weight	Price/ CWT	Total Value	
Steer Calves	Head	25	485	78.43	9,510	
Heifer Calves	Head	15	460	68.50	4,727	
Cull Cows	Head	10	1,065	40.96	4,362	
Total					18,599	
Total/Cow						309.98

2. Variable Costs	Value	Cost/ Cow
BLM Permit	102	1.70
Leased	1,170	19.50
Deeded	0	0.00
Crop Residue	0	0.00
Hay (prod.)	2,190	36.50
Hay (purch.)	1,040	17.33
Oats	1,000	16.67
Protein Supp.	711	11.86
Salt & Minerals	113	1.88
Hired Labor	93	1.54
Trucking	106	1.76
Marketing	296	4.93
Vet Medicine	289	4.81
Misc. Expense	70	1.17
Mach. Fuel & Lube	2,085	34.74
Machinery Repair	1,275	21.25
Equip. Fuel & Lube	218	3.64
Equip. Repair	162	2.70
Interest on Oper. Capital	725	12.09
Total Variable Costs	11,645	194.08
3. Income Above Variable Costs	6,954	115.90

4. Other Costs	Value	Cost/ Cow
Machinery	3,210	53.50
Equipment	593	9.88
Livestock	2,418	40.30
Land Taxes	405	6.74
General Farm Overhead	1,333	22.21
Total Other Costs	7,959	132.65
5. Family Labor	4,494	74.90
6. Total of Above Costs	24,098	401.63
7. Return to Family Labor and Investment	-1,005	-16.75
8. Return to Investment	-5,499	-91.65

Production Assumptions - Herd size 60 cows; 85% calf crop; 25 cows per bull; 17% replacement rate; 1% cow loss.

TABLE B-2

REPRESENTATIVE RANCH BUDGET - HERD SIZE 172

1. Production

Sales:	Unit	Number	Average Weight	Price/ CWT	Total Value	
Steer Calves	Head	72	485	78.43	27,388	
Heifer Calves	Head	44	460	68.50	13,864	
Cull Cows	Head	28	1,065	40.96	12,214	
Total					53,466	
Total/Cow						310.85

2. Variable Costs	Value	Cost/ Cow
BLM Permit	268	1.56
Leased	5,183	30.13
Deeded	0	0.00
Crop Residue	0	0.00
Hay (prod.)	6,749	39.24
Hay (purch.)	1,169	6.80
Oats	3,727	21.67
Protein Supp.	2,087	12.14
Salt & Minerals	317	1.84
Hired Labor	1,056	6.14
Trucking	988	5.74
Marketing	690	4.01
Vet Medicine	2,069	12.03
Misc. Expense	335	1.95
Mach. Fuel & Lube	3,671	21.35
Machinery Repair	1,976	11.49
Equip. Fuel & Lube	261	1.52
Equip. Repair	559	3.25
Interest on Oper. Capital	1,938	11.27
Total Variable Costs	33,043	192.11
3. Income Above Variable Costs	20,423	118.74

4. Other Costs	Value	Cost/ Cow
Machinery	8,523	49.55
Equipment	2,458	14.29
Livestock	7,031	40.88
Land Taxes	1,526	8.87
General Farm Overhead	2,204	12.81
Total Other Costs	21,742	126.41
5. Family Labor	7,752	45.07
6. Total of Above Costs	62,537	363.59
7. Return to Family Labor and Investment	-1,319	-7.67
8. Return to Investment	-9,071	-52.74

Production Assumptions - Herd size 172 cows; 85% calf crop; 25 cows per bull; 17% replacement rate; 1% cow loss.

TABLE B-3

REPRESENTATIVE RANCH BUDGET - HERD SIZE 403

1. Production

Sales:	Unit	Number	Average Weight	Price/ CWT	Total Value	
Steer Calves	Head	169	485	78.43	64,285	
Heifer Calves	Head	101	460	68.50	31,825	
Cull Cows	Head	69	1,065	40.96	30,099	
Total					126,209	
Total/Cow						313.17

2. Variable Costs	Value	Cost/ Cow
BLM Permit	292	0.72
Leased	14,022	34.79
Deeded	0	0.00
Crop Residue	0	0.00
Hay (prod.)	13,479	33.45
Hay (purch.)	3,833	9.51
Oats	7,664	19.02
Protein Supp.	5,109	12.68
Salt & Minerals	742	1.84
Hired Labor	7,496	18.60
Trucking	2,060	5.11
Marketing	2,019	5.01
Vet Medicine	4,038	10.02
Misc. Expense	536	1.33
Mach. Fuel & Lube	7,870	19.53
Machinery Repair	4,409	10.94
Equip. Fuel & Lube	659	1.64
Equip. Repair	1,401	3.48
Interest on Oper. Capital	4,656	11.55
Total Variable Costs	80,285	199.22
3. Income Above Variable Costs	45,924	113.96

4. Other Costs	Value	Cost/ Cow
Machinery	16,325	40.51
Equipment	6,356	15.77
Livestock	16,297	40.44
Land Taxes	3,261	8.09
General Farm Overhead	3,854	9.56
Total Other Costs	46,093	114.37
5. Family Labor	9,125	22.64
6. Total of Above Costs	135,503	336.24
7. Return to Family Labor and Investment	-169	-0.42
8. Return to Investment	-9,294	-23.06

Production Assumptions - Herd size 403 cows; 85% calf crop; 25 cows per bull; 17% replacement rate; 1% cow loss.

TABLE B-4

REPRESENTATIVE RANCH BUDGET - HERD SIZE 403 (with AMPs)

1. Production

Sales:	Unit	Number	Average Weight	Price/ CWT	Total Value
Steer Calves	Head	169	485	78.43	64,285
Heifer Calves	Head	101	460	68.50	31,825
Cull Cows	Head	69	1,065	40.96	30,099
Total					126,209
Total/Cow					313.17

2. Variable Costs	Value	Cost/ Cow
BLM Permit	3,081	7.65
Leased	6,092	15.12
Deeded	0	0.00
Crop Residue	0	0.00
Hay (prod.)	13,479	33.45
Hay (purch.)	3,833	9.51
Oats	7,664	19.02
Protein Supp.	5,109	12.68
Salt & Minerals	742	1.84
Hired Labor	7,496	18.60
Trucking	2,060	5.11
Marketing	2,019	5.01
Vet Medicine	4,038	10.02
Misc. Expense	536	1.33
Mach. Fuel & Lube	7,870	19.53
Machinery Repair	4,409	10.94
Equip. Fuel & Lube	659	1.64
Equip. Repair	1,401	3.48
Interest on Oper. Capital	4,656	11.55
Total Variable Costs	75,144	186.46
3. Income Above Variable Costs	51,065	126.71

4. Other Costs	Value	Cost/ Cow
Machinery	16,325	40.51
Equipment	6,356	15.77
Livestock	16,297	40.44
Land Taxes	3,261	8.09
General Farm Overhead	3,854	9.56
Total Other Costs	46,093	114.37
5. Family Labor	9,125	22.64
6. Total of Above Costs	130,362	323.48
7. Return to Family Labor and Investment	4,972	12.34
8. Return to Investment	-4,153	-10.31

Production Assumptions - Herd size 403 cows; 85% calf crop; 25 cows per bull; 17% replacement rate; 1% cow loss.

TABLE B-5

REPRESENTATIVE RANCH BUDGET - HERD SIZE 901

1. Production

Sales:	Unit	Number	Average Weight	Price/ CWT	Total Value	
Steer Calves	Head	379	485	78.43	144,166	
Heifer Calves	Head	225	460	68.50	70,898	
Cull Cows	Head	153	1,065	40.96	66,742	
Total					281,806	
Total/Cow						312.77

2. Variable Costs	Value	Cost/ Cow
BLM Permit	920	1.02
Leased	38,380	42.60
Deeded	0	0.00
Crop Residue	0	0.00
Hay (prod.)	19,193	21.30
Hay (purch.)	11,045	12.26
Oats	12,335	13.69
Protein Supp.	12,255	13.60
Salt & Minerals	1,693	1.88
Hired Labor	21,524	23.89
Trucking	3,467	3.85
Marketing	6,289	6.98
Vet Medicine	5,482	6.08
Misc. Expense	242	0.27
Mach. Fuel & Lube	14,270	15.84
Machinery Repair	8,707	9.66
Equip. Fuel & Lube	1,693	1.88
Equip. Repair	3,547	3.94
Interest on Oper. Capital	10,642	11.81
Total Variable Costs	171,684	190.55
3. Income Above Variable Costs	110,122	122.22

4. Other Costs	Value	Cost/ Cow
Machinery	33,036	36.67
Equipment	14,999	16.65
Livestock	36,651	40.68
Land Taxes	7,039	7.81
General Farm Overhead	7,324	8.13
Total Other Costs	99,049	109.93
5. Family Labor	12,107	13.44
6. Total of Above Costs	282,840	313.92
7. Return to Family Labor and Investment	11,073	12.29
8. Return to Investment	-1,034	-1.15

Production Assumptions - Herd size 901 cows; 85% calf crop; 25 cows per bull; 17% replacement rate; 1% cow loss.

TABLE B-6

SHORT-TERM CHANGE PER RANCH IN NUMBER OF BLM AUMs

BY RANCH SIZE CATEGORY AND ALTERNATIVE

Ranch Size Category (Cow Units)	Number of Ranches	Alt. A		Alt. B		Alt. C		Alt. D	
		No.	%	No.	%	No.	%	No.	%
0-100	13	-	-	-	-	-9	-20	-43	-100
101-250	12	-	-	-	-	-23	-20	-113	-100
251-600	13	-	-	-	-	-25	-20	-123	-100
251-600[1/]	3	-	-	-	-	-272	-20	-1,300	-100
Greater than 600	3	-	-	-	-	-80	-20	-388	-100

1/ - Allotments with AMPs.

TABLE B-7

LONG-TERM CHANGE PER RANCH IN NUMBER OF BLM AUMs

BY RANCH SIZE CATEGORY AND ALTERNATIVE

Ranch Size Category (Cow Units)	Number of Ranches	Alt. A		Alt. B		Alt. C		Alt. D	
		No.	%	No.	%	No.	%	No.	%
0-100	13	-	-	-	-	-9	-20	-43	-100
101-250	12	-	-	-	-	-23	-20	-113	-100
251-600	13	-	-	-	-	-25	-20	-123	-100
251-600 1/	3	184	14	-	-	-77	-6	-1,300	-100
Greater than 600	3	-	-	-	-	-80	-20	-388	-100

1/ - Allotments with AMPs.

TABLE B-8

CHANGE IN ANNUAL INCOME PER RANCH BY RANCH SIZE CATEGORY

AND PERCENT REDUCTION OR INCREASE IN BLM AUMs

Ranch Size Category (Cow Units)	Percent Reduction			Percent Increase
	6	20	100	14
0-100	N/A[1/]	-91	-434	N/A
101-250	N/A	-235	-1,153	N/A
251-600	N/A	-247	-1,218	N/A
251-600[2/]	-762	-2,753	-12,874	1,822
Greater than 600	N/A	-584	-3,734	N/A

1/ - Not applicable.

2/ - Allotments with AMPs.

APPENDIX C

CULTURAL RESOURCE COMPLIANCE PROCEDURES

To comply with the National Historic Preservation Act of 1966, 36 CFR 800, and Executive Order 11593, all areas where ground is to be disturbed by range developments are to be inventoried for prehistoric and historic features. Where feasible, all sites found by this inventory are to be avoided. The results of the inventory and determinations of eligibility for the National Register of Historic Places are to be forwarded to the North Dakota State Historic Preservation Officer for comment.

If sites are found to be eligible for the national register and cannot be avoided, a determination of the effect of the project on the site(s), including appropriate mitigating measures if necessary, will be done in consultation with the North Dakota Historic Preservation Officer and the Advisory Council on Historic Preservation. No action affecting the site is to be taken until the advisory council has had opportunity to make comments.

If buried cultural remains are encountered during construction, the operator is to temporarily discontinue construction until the BLM evaluates the discovery and determines the appropriate action.

APPENDIX D

METHODOLOGY FOR ASSESSING REGIONAL ECONOMIC IMPACTS

For analysis purposes, direct and indirect changes in the West River Resource Area output, earnings and employment, are based on estimated changes in livestock sales and range development construction. Changes in livestock sales would occur both in the short and long term while range development construction is assumed to occur only in the short term. Changes in earnings and employment are compared to the Resource Area figures of $532 million and 46,523 respectively.

Coefficients from the BLM-North Dakota Economic and Demographic (E/D) model were used to estimate changes in gross business volume, earnings and employment.

APPENDIX E
ALLOTMENT SUMMARY DATA

G.R.	ACRE	BLM AUM	Other Range	CL	No	Season	% BLM	Range Condition E - G	Range Condition F	Cropland (AC)	
3215	7965	1161	620	C	235	6/1-11/20	88	7965		1700	
	960	147	13,180	C			7	960			Outside AMP
3154	8072	1630	3,145	C,Y	400	5/1-11/1	68	8072		1000	
	201	51	9,855				6	201			Outside AMP
3178	4366	913	1,280	C	300	6/1-10/1	76	4366			
	816	185	11,320	C			19		160		Outside AMP
3199	3908	712		C	1000	11/1-3/1	6	3908			
3221	2388	308	8,212	C	220	6/1-12/31	20	2388		350	
3165	2320	464	6,000	C	150	3/1-12/31	3	2320		50	
3214	1886	190	30,000	C	800	4/1-12/30	3	1600	286	4000	
3207	1737	316		C		10/15-3/2		U/C			
3180	1610	328	16,640	C	350	5/15-11/15	15	1610		350	
3202	1200	100	9,000	C	275	5/1-11/1	6	1020	180	1000	
3197	1155	177	15,000	C,S	500/500	5/1-11/1	5	875	280	2500	
3209	1074	71	1,600	C,H,S,G	50,7,35	6/1-11/1	21	1074		65	
3195	772	163	12,346	C,S	300-75	6/1-10/1	13	521	249	1700	
3166	766	105	12,000	C	400	3/1-11/1	3	766		300	
3198	640	183									USFS Grasslands
3174	640	39	1,700	C	50	4/1-11/1	11	560	80	300	
3240	558	82		C		5/1-5/11		U/C			USFS Grasslands
3153	471	158	9,000	C	950	5/1-11/1	4	471		3500	
3187	451	56						U/C			
3206	440	108	1,360	C	150	5/1-11/1	12	440		4500	
3227	419	94	3,900	C	150	5/1-11/1	10	99	320	800	
3161	400	40						200	200		
3225	389	100	24,000	C	500	5/1-11/1	1	389		2500	
3234	320	80		C	250			U/C			
3169	320	64		C	50				320		
3223	316	56	11,000	C	325	6/1-10/1	4	316		150	
3188	305	26		C	300			305			
3151	280	94	Included with G.R.#3153						280		
3203		93		C	200			280			
3170	278	86		C	90				278		
3190	278	48	6,000	C	275	5/1-11/1	2	238	40	1600	
3172	278	26	2,880	C	120	6/1-11/1	4	80	198	610	
3229	240	67									
3164	231	47	1,120	C	47	5/1-11/1	17	231		156	
3191	200	24						200			
3181	175	23						U/C			

*Maintenance category allotments. Remaining allotments are in the Custodial category.

G.R.	ACRE	BLM AUM	Other Range	CL	No	Season	% BLM	Range Condition E - G	Range Condition F	Cropland (AC)	
3254	161	27	2,000	C	150	6/1-11/1	3	U/C		1700	
3150	160	54	10,000	C	600	6/1-11/1	2	160		1000	
3159	160	53									
3205	160	24	2,280	C	90	5/1-11/1	4		160	520	
3237	160	10	3,600	C	375	5/1-12/1	1	U/C		800	
3184	120	32		C	150			120			
3182	120	30	1,300	C	75	4/1-12/30	5	120		160	
3162	120	30						120			
3175		11	640	C	45	4/1-12/1			120	91	
3213	120	10	Included with G.R.#3214						120		
3220	119	37	2,000	C	45	5/1-11/1	14		119	300	
3179	116	38		C	50				116		
3200	91	27	1,656	C	120	5/15-12/15	3	91		575	
3156	80	32	600	C	50	5/1-11/1	10	80		500	
3196	80	27	1,490	C	60	5/1-11/1	8	40	40	1730	
3193	80	27		C	60			U/C			
3155	80	26	3,000	C	50	5/1-11/1	9	80		1200	
3233	80	25	2,000	C	45	5/1-11/1	10		80	800	
3212	80	23	1,200	C	250	6/1-1/1	1			250	
3167	80	23	1,000	C,S	60,-100	6/1-11/1	5	80		500	
3241	80	20	4,200	C	200	5/1-12/1	1	40	40	980	
3201	80	20						80			
3208			640	C	55	5/15-10/15	7	80		230	
3152											
3210	80	14	1,200	C	60	5/1-11/1	4	U/C		65	
3235	80	12	15,000	C	500	5/1-11/1	1	40	40	2000	
3176	80	9	1,440	S	300	6/1-9/1	3		80	200	
3177	80	8		C		6/1-9/1		80			
3160	79	16	200	C	10	5/1-11/1	25	80		15	
3244	51	12	5,000	C	285	5/1-11/1	1	30		4000	21 ac. cropped
3185	40	20						U/C			No Livestock
3228	40	20	720	C	50	5/1-11/1	7	U/C		350	
3224	40	18									
3216	40	16	1,056	C	350	5/1-12/1	1	U/C		582	
3239	40	16	5,000	Y	650	5/15-10/15	4	U/C		1000	
3157	40	16	380				10	U/C			No Livestock
3192	40	15						U/C			
3253	40	14	440	C, Y	50,-80	6/1-10/1	8	40		620	
3189	40	14	2,000	C	200	4/1-1/1	1	U/C		600	
3211	40	13						U/C			
3194	40	13	40	Y	30	9/1-11/1	50	U/C			
3173	40	13						U/C			
3218	40	12	900	C	50	6/1-12/1	4	U/C	40	1720	
3236	40	10						U/C			

G.R.	ACRE	BLM AUM	Other Range	CL	No	Season	% BLM	Range Condition E - G	Range Condition F	Cropland (AC)
3204	40	10	1,050	C	150	6/1-11/1	1	U/C		600
3247	40	10						40		
3163	40	10	2,000	C	100	5/1-11/1	2	40		350
3158	40	10	1,250	C	100	5/15-11/15	2	U/C		2000
3217	40	8	2,180	C	275	5/1-11/1	1	40		1100
3222	40	8	1,620	C	100	5/1-11/15	1	U/C		510
3242	40	8	2,140	C	150	4/1-11/1	1	40		200
3171	40	6	2,400	C	80	5/1-11/1	1		40	500
3246	40	4	700	C,H	45	4/1-11/1	1		40	1800
3230	39	12						U/C		
3243	39	10	2,000	S	800	5/1-11/1	1	39		800
3186	38	11	1,870	C	75	4/15-12/1	2	38		485
3219	37	12						37		
3252	35	10	340	C	35	5/1-11/1	5	35		300
3238	32	8	500	H				32		
3251	25	8	500	C	70	4/1-5/15	19	25		300
3183	18	6	850	Y	135	5/1-11/1	1	18		80
3226	16	7	675	C	95	5/1-11/1	1	U/C		175
3250	15	5						15		

APPENDIX F
ENVIRONMENTAL CONSEQUENCES CHART
ALLOTMENT SUMMARY

G.R. No.	AMP Allotments	Potential AUM	Alternative A ST	Alternative A LT	Alternative B ST	Alternative B LT	Alternative C ST	Alternative C LT	Alternative D ST	Alternative D LT
3215	Turbiville	1392	1161	1392	1161	1161	929	1113	0	0
3154	Nyquist	1950	1630	1950	1630	1630	1304	1560	0	0
3178	Putnam	1095	913	1095	913	913	730	876	0	0

None AMP Allotments

G.R. No.		Alternative A ST	Alternative A LT	Alternative B ST	Alternative B LT	Alternative C ST	Alternative C LT	Alternative D ST	Alternative D LT
3215	Outside AMP	147	147	147	147	118	118	0	0
3154		51	51	51	51	41	41	0	0
3178		185	185	185	185	148	148	0	0
3199		712	712	712	712	570	570	0	0
3165		464	464	464	464	371	371	0	0
3180		328	328	328	328	262	262	0	0
3207		316	316	316	316	253	253	0	0
3221		308	308	308	308	246	246	0	0
3214		190	190	190	190	152	152	0	0
3198		183	183	183	183	146	146	0	0
3197		177	177	177	177	142	142	0	0
3195		163	163	163	163	130	130	0	0
3153		158	158	158	158	126	126	0	0
3206		108	108	108	108	86	86	0	0
3166		105	105	105	105	84	84	0	0
3202		100	100	100	100	80	80	0	0
3225		100	100	100	100	80	80	0	0
3227		94	94	94	94	75	75	0	0
3151		94	94	94	94	75	75	0	0
3203		93	93	93	93	74	74	0	0
3170		86	86	86	86	69	69	0	0
3240		82	82	82	82	66	66	0	0
3234		80	80	80	80	64	64	0	0
3209		71	71	71	71	57	57	0	0
3229		67	67	67	67	54	54	0	0

ENVIRONMENTAL CONSEQUENCES CHART ALLOTMENT SUMMARY CONTINUED:

G.R. No.	Alternative A		Alternative B		Alternative C		Alternative D	
	ST	LT	ST	LT	ST	LT	ST	LT
3169	64	64	64	64	51	51	0	0
3187	56	56	56	56	45	45	0	0
3223	56	56	56	56	45	45	0	0
3150	54	54	54	54	43	43	0	0
3159	53	53	53	53	42	42	0	0
3190	48	48	48	48	38	38	0	0
3164	47	47	47	47	38	38	0	0
3161	40	40	40	40	32	32	0	0
3174	39	39	39	39	31	31	0	0
3179	38	38	38	38	30	30	0	0
3220	37	37	37	37	30	30	0	0
3184	32	32	32	32	26	26	0	0
3156	32	32	32	32	26	26	0	0
3182	30	30	30	30	24	24	0	0
3162	30	30	30	30	24	24	0	0
3254	27	27	27	27	22	22	0	0
3200	27	27	27	27	22	22	0	0
3196	27	27	27	27	22	22	0	0
3193	27	27	27	27	22	22	0	0
3188	26	26	26	26	21	21	0	0
3172	26	26	26	26	21	21	0	0
3155	26	26	26	26	21	21	0	0
3233	25	25	25	25	21	21	0	0

The rest of the allotments have less than 25 AUMs.

*Existing AUMs authorized is the same as the short term utilization indicated under alternative "A."

APPENDIX G

UNLEASED LANDS
WEST RIVER RESOURCE AREA

LEGAL DESCRIPTION

COUNTY: Adams

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
129 N.	91 W.	5	NE1/4SE1/4	40.00	Upland-grassland presently grazed.

COUNTY: Billings

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
141 N.	101 W.	18	SE1/4SE1/4	40.00	Upland-grassland presently grazed.

COUNTY: Bowman

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
130 N.	101 W.	35	SW1/4SE1/4	40.00	Upland-grassland presently grazed.
130 N.	104 W.	6	Lot 1	40.10	Hilly-grassland presently grazed.
129 N.	106 W.	30	Lot 1	39.47	Rolling grassland presently grazed.
131 N.	105 W.	31	Lot 9	1.44	River bottom presently grazed.
129 N.	106 W.	19	Lot 4	39.41	Rolling grassland presently grazed.

COUNTY: Dunn

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
147 N.	95 W.	2	SE1/4SW1/4	40.00	These are scattered tracts located in the Little Missouri breaks. Some portions have been grazed by livestock. Refer to Dunn County URA and West Central MFP for more detail.
147 N.	95 W.	8	NW1/4SE1/4	40.00	

Dunn County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
147 N.	95 W.	8	S1/2SE1/2	80.00	
147 N.	95 W.	10	W1/2NW1/4	80.00	
147 N.	95 W.	10	NW1/4SW1/4	40.00	
148 N.	96 W.	6	Lot 7	9.50	
148 N.	96 W.	6	Lot 8	12.87	
148 N.	96 W.	7	Lot 3	38.14	
148 N.	96 W.	7	Lot 4	0.80	
148 N.	96 W.	17	E1/2NE1/4	80.00	
148 N.	96 W.	17	NW1/4NE1/4	40.00	
148 N.	96 W.	17	Lot 1	39.70	
148 N.	96 W.	17	Lot 2	27.20	
148 N.	96 W.	17	Lot 3	38.60	
148 N.	96 W.	17	Lot 4	44.70	
148 N.	97 W.	9	Lot 1	2.50	
148 N.	97 W.	9	Lot 2	27.00	

COUNTY: Grant

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
130 N.	85 W.	10	Lot 1	2.80	No Inventory
130 N.	85 W.	10	Lot 2	2.10	No Inventory

Grant County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
130 N.	86 W.	26	Lot 1	7.96	No Inventory
130 N.	86 W.	30	Lot 2	38.28	Grassland grazed.
131 N.	86 W.	22	E1/2SW1/4 & SE1/4	240.00	Grassland grazed.
135 N.	86 W.	34	NW1/4NW1/4	40.00	Grassland. Hasn't been grazed.
132 N.	87 W.	32	N1/2NW1/4	80.00	Grassland grazed.
129 N.	87 W.	8	Lot 1	1.20	No Inventory.
129 N.	87 W.	9	Lot 2	0.08	No Inventory.
132 N.	88 W.	24	SE1/4NE1/4	40.00	Grassland grazed.
134 N.	88 W.	18	Lot 1	9.69	No Inventory.
134 N.	88 W.	30	Lot 1	11.48	Cropland.
130 N.	89 W.	34	NW1/4NE1/4	40.00	Grassland grazed.
130 N.	90 W.	27	Lot 4	0.50	No Inventory.
130 N.	90 W.	28	Lot 3	1.50	Highway R/W
131 N.	84 W.	30	Lot 14	0.87	No Inventory.
131 N.	84 W.	2	Lot 10	7.85	No Inventory.

COUNTY: McKenzie

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
152 N.	93 W.	8	Lot 4	14.95	Missouri River Breaks, grazed by livestock.

McKenzie County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
153 N.	94 W.	3	Lot 3	2.22	Under Lake Sakakawea
153 N.	93 W.	28	Lot 5	38.30	Under Lake Sakakawea
153 N.	93 W.	28	Lot 6	31.40	Under Lake Sakakawea
153 N.	93 W.	28	Lot 7	25.70	Under Lake Sakakawea
153 N.	93 W.	28	Lot 8	16.50	Under Lake Sakakawea
153 N.	93 W.	28	S1/2SW1/4	80.00	Under Lake Sakakawea
149 N.	95 W.	1	Lot 1	48.10	Upland-grassland presently grazed.
149 N.	95 W.	10	SE1/4SE1/4	40.00	Upland-grassland presently grazed.
150 N.	95 W.	24	Lot 4	46.99	Upland-grassland presently grazed.
150 N.	95 W.	25	Lot 1	47.11	Upland-grassland presently grazed.
152 N.	98 W.	5	Lot 10	40.00	Upland-grassland presently grazed.
152 N.	98 W.	5	Lot 11	40.00	Upland-grassland presently grazed.
152 N.	98 W.	5	Lot 12	40.00	Upland-grassland presently grazed.
153 N.	98 W.	24	SW1/4SE1/4	40.00	Upland-grassland presently grazed.
153 N.	98 W.	25	W1/2NE1/2	80.00	Upland-grassland presently grazed.
147 N.	99 W.	22	NW1/4NW1/4	40.00	Upland-grassland presently grazed.
149 N.	99 W.	35	NE1/4NE1/4	40.00	Upland-grassland presently grazed.
152 N.	99 W.	7	Lot 3	37.60	Upland-grassland presently grazed.

McKenzie County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
152 N.	99 W.	24	NW1/4NE1/4	40.00	Upland-grassland presently grazed.
152 N.	100 W.	24	SE1/4NW1/4	40.00	Upland-grassland presently grazed.
152 N.	100 W.	24	SW1/4SW1/4	40.00	Upland-grassland presently grazed.
152 N.	100 W.	26	NE1/4NW1/4	40.00	Upland-grassland presently grazed.
153 N.	100 W.	6	Lot 9	20.70	Under Lake Sakakawea
153 N.	100 W.	18	NE1/4SW1/4	40.00	Missouri River Breaks
153 N.	100 W.	18	Lot 3	39.85	Missouri River Breaks
152 N.	101 W.	12	NW1/4SE1/4	40.00	Partially farmed.
152 N.	101 W.	14	SW1/4SW1/4	40.00	Upland-grassland presently grazed.
152 N.	101 W.	14	SE1/4SE1/4	40.00	Upland-grassland presently grazed.
152 N.	101 W.	22	SE1/4NW1/4	40.00	Upland-grassland presently grazed.
153 N.	101 W.	10	SE1/4SE1/4	40.00	Upland-grassland presently grazed.
149 N.	102 W.	17	NE1/4SE1/4	40.00	Upland-grassland presently grazed.
152 N.	102 W.	21	Lot 5	1.01	Section Line Road
152 N.	103 W.	13	Lot 6	25.00	Shoreline Lake Sakakawea
152 N.	103 W.	13	Lot 7	31.10	Shoreline Lake Sakakawea
152 N.	103 W.	14	Lot 5	3.75	Shoreline Lake Sakakawea
152 N.	103 W.	24	SE1/4SW1/4	40.00	Upland-grassland presently grazed.
151 N.	104 W.	26	Lot 1	9.00	Shoreline Lake Sakakawea
151 N.	104 W.	35	SW1/4NE1/4	10.00	Upland-grassland

McKenzie County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
152 N.	104 W.	21	Lot 7	17.50	These lands are located within the meander zone of the Yellowstone River, requiring ownership determination.
152 N.	104 W.	22	Lot 3	6.60	
152 N.	104 W.	22	Lot 4	10.00	
152 N.	104 W.	27	Lot 3	1.63	
152 N.	104 W.	30	Lot 1	34.13	

COUNTY: Mercer

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
144 N.	84 W.	14	Lot 5	17.40	Washed away by Missouri River.
144 N.	84 W.	14	Lot 6	14.10	Washed away by Missouri River.
144 N.	84 W.	14	Lot 7	16.80	Washed away by Missouri River.
144 N.	84 W.	14	Lot 8	15.70	Washed away by Missouri River.
144 N.	84 W.	24	Lot 5	12.60	Washed away by Missouri River.
144 N.	84 W.	24	Lot 6	41.70	Washed away by Missouri River.
144 N.	84 W.	24	W1/2SW1/4	80.00	Estimated 5 acres left.
144 N.	84 W.	24	Lot 7	20.50	Washed away by Missouri River.
144 N.	84 W.	24	Lot 8	25.90	Washed away by Missouri River.
146 N.	84 W.	18	Lot 2	12.54	Washed away by Missouri River.
146 N.	84 W.	18	Lot 3	17.88	Washed away by Missouri River.
146 N.	84 W.	18	Lot 6	25.44	Washed away by Missouri River.

Mercer County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
146 N.	84 W.	18	Lot 7	38.45	Washed away by Missouri River.
146 N.	87 W.	6	SE1/4NW1/4	10.00	Under Lake Sakakawea
143 N.	89 W.	34	NW1/4SW1/4	40.00	Upland-grassland presently grazed.
142 N.	90 W.	4	NE1/4SW1/4	40.00	Upland-grassland presently grazed.

COUNTY: Morton

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
134 N.	80 W.	24	Lot 10	17.40	Cannonball River frontage next to U.S. Corps. of Engr. property.
134 N.	80 W.	28	Lot 12	2.40	Cannonball River frontage next to U.S. Corps. of Engr. property.
137 N.	80 W.	9	Lot 9	24.30	Ownership questionable river change location.
137 N.	80 W.	15	Lot 5	37.06	Within the Oahe takeline.
137 N.	80 W.	18	Lot 7	1.00	Hart River meander transfer to U.S. Corps. of Engr.
139 N.	81 W.	24	Lot 1	5.02	Taken by river.
133 N.	82 W.	22	Lot 7	15.96	Cannonball river meander.
137 N.	79 W.	33	lot 4	19.70	Within the U.S. Corps. of Engr. takeline

COUNTY: Oliver

141 N.	81 W.	2	Lot 4	14.50	Upland-grassland
141 N.	81 W.	12	Lot 7	23.50	Taken by Missouri River.
144 N.	83 W.	32	Lot 5	4.26	Located along Missouri River, existence questionable.

Oliver County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
144 N.	83 W.	32	Lot 6	8.87	Located along Missouri River, existence questionable.
144 N.	83 W.	32	Lot 7	20.94	Located along Missouri River, existence questionable.
144 N.	83 W.	32	Lot 8	40.38	Located along Missouri River, existence questionable.

APPENDIX H

UNLEASED LANDS
EAST RIVER RESOURCE AREA

LEGAL DESCRIPTION

COUNTY: Barnes

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
143 N.	60 W.	12	Lot 1	2.29	No Inventory. Near Lake Benson.
143 N.	60 W.	12	Lot 2	2.27	No Inventory. Near Lake Benson

COUNTY: Benson

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
151 N.	65 W.	35	Lot 1	5.30	No Inventory. Cheyenne River.
151 N.	67 W.	13	Lot 2	4.14	Located between section line road and Fort Totten Indian Reservation.

COUNTY: Burleigh

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
142 N.	75 W.	12	S1/2SW1/4	80.00	*20% land, 80% water - saline.
142 N.	75 W.	14	S1/2SW1/4	80.00	*10% land, 90% water - saline.
142 N.	75 W.	14	E1/2SE1/4	80.00	*10% land, 90% water - saline.
142 N.	75.W.	22	N1/2NE1/4	80.00	*90% water.
142 N.	75 W.	26	NW1/4NE1/4	40.00	*90% water - saline.

Burleigh County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
142 N.	75 W.	26	NE1/4NW1/4	40.00	*90% water - saline.
144 N.	77 W.	22	NE1/4	160.00	*90% water - saline.
137 N.	79 W.	19	Tract 39	26.76	*Oahe Reservoir.
137 N.	79 W.	33	Lot 1	9.30	Oahe Reservoir.
137 N.	80 W.	14	Lot 2	35.50	Oahe Reservoir.
139 N.	81 W.	4	Lot 1	3.70	Missouri River Bank.
139 N.	81 W.	14	Lot 1	11.30	Missouri River Bank.
141 N.	81 W.	24	Lot 4	46.50	Missouri River riparian 50% wooded.
142 N.	81 W.	4	Lot 4	19.60	Missouri River riparian 50% wooded.
141 N.	81 W.	26	Lot 1	28.20	Much of the tract has been taken by the Missouri River.
141 N.	81 W.	26	Lot 2	53.40	Much of the tract has been taken by the Missouri River.
141 N.	81 W.	26	NE1/4SE1/4	40.00	Much of the tract has been taken by the Missouri River.
141 N.	81 W.	26	SW1/4SE1/4	40.00	Much of the tract has been taken by the Missouri River.

COUNTY: Cavalier

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
163 N.	58 W.	6	SW1/4NE1/4	40.00	*Wooded.
163 N.	58 W.	25	SE1/4NW1/4	40.00	Wooded.

Cavalier County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
162 N.	58 W.	9	NW1/4NE1/4	40.00	Wooded.
164 N.	59 W.	35	NE1/4NE1/4	40.00	Wooded.

COUNTY: Divide

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
163 N.	95 W.	25	SW1/4SW1/4	40.00	*80% water.
163 N.	95 W.	26	SE1/4SE1/4	40.00	80% water.
163 N.	95 W.	27	SW1/4SE1/4	40.00	50% water.
160 N.	99 W.	5	SW1/4SE1/4	40.00	100% water.
160 N.	100 W.	22	SW1/4NE1/4	40.00	90% water.
160 N.	100 W.	22	NW1/4SE1/4	40.00	100% water.
162 N.	102 W.	8	SW1/4NW1/4	40.00	*90% water - saline.
162 N.	102 W.	8	N1/2SW1/4	80.00	90% water - saline.
162 N.	102 W.	17	NE1/4NW1/4	40.00	20% upland. Miller Lake (saline).
162 N.	102 W.	20	SW1/4NE1/4	40.00	10% upland. Miller Lake (saline).
162 N.	102 W.	20	S1/2NW1/4	80.00	10% upland. Miller Lake (saline).
162 N.	102 W.	20	SW1/4	160.00	100% water. Miller Lake (saline).
162 N.	102 W.	29	NW1/4	160.00	90% water. Miller Lake (saline).

Divide County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
162 N.	102 W.	30	SE1/4NE1/4	40.00	100% water. Miller Lake (saline).
162 N.	102 W.	30	NE1/4SE1/4	40.00	80% water. Miller Lake (saline).
163 N.	102 W.	26	SE1/4NE1/4	40.00	50% water.
163 N.	102 W.	26	SW1/4NW1/4	40.00	70% water.
160 N.	103 W.	15	W1/2NW1/4	80.00	95% water.
160 N.	103 W.	15	NW1/4SW1/4	40.00	100% water.
160 N.	103 W.	21	NE1/4NW1/4	40.00	100% water.
160 N.	103 W.	33	Lot 1	60.80	30% water. Some cropland.
161 N.	103 W.	23	NE1/4NE1/4	40.00	75% water.
161 N.	103 W.	23	SE1/4SE1/4	40.00	80% water.
161 N.	103 W.	24	SW1/4SW1/4	40.00	80% water.
162 N.	103 W.	3	Lot 1	40.03	90% water.
162 N.	103 W.	3	Lot 2	40.02	90% water.
162 N.	103 W.	3	Lot 3	22.36	90% water.
162 N.	103 W.	3	Lot 4	22.42	90% water.
162 N.	103 W.	3	S1/2NE1/4	80.00	90% water.
163 N.	103 W.	14	S1/2SE1/4	80.00	90% water.

COUNTY: Eddy

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
150 N.	63 W.	14	Lot 1	2.78	No Inventory.
150 N.	63 W.	19	Lot 1	0.25	No Inventory.
149 N.	63 W.	27	Lot 1	10.82	No Inventory.
152 N.	65 W.	24	SE1/4NE1/4	40.00	No Inventory.

COUNTY: Emmons

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
135 N.	74 W.	6	Lot 1	46.13	95% water.
136 N.	74 W.	32	S1/2NE1/4	80.00	95% water.
136 N.	74 W.	32	S1/2NW1/4	80.00	95% water.
136 N.	74 W.	32	S1/2	320.00	95% water.
134 N.	78 W.	5	Lot 6	12.83	No Inventory.
135 N.	78 W.	33	Lot 2	2.49	No Inventory.

COUNTY: Grand Forks

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
151 N.	52 W.	13	SE1/4SW1/4	40.00	Salt water seep.

COUNTY: Kidder

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
139 N.	70 W.	10	Lot 4	7.54	No Inventory.
137 N.	71 W.	24	Lot 5	8.58	No Inventory.
140 N.	71 W.	6	SE1/4NE1/4	40.00	*98% water.
140 N.	71 W.	6	SE1/4	160.00	*98% water.
144 N.	71 W.	28	Lot 3	15.50	No Inventory.
138 N.	72 W.	4	NE1/4	158.89	*90% water.
138 N.	72 W.	4	S1/2NW1/4	80.00	*90% water.
138 N.	72 W.	4	SW1/4	160.00	*90% water.
138 N.	72 W.	8	NE1/4NE1/4	40.00	*90% water.
138 N.	72 W.	18	NW1/4	156.32	*80% water.
140 N.	72 W.	14	Lot 2	36.80	*90% water.
140 N.	72 W.	14	Lot 1	32.00	*90% water.
140 N.	72 W.	22	SE1/4NE1/4	40.00	*60% water.
140 N.	72 W.	22	SE1/4	160.00	*60% water.
141 N.	72W.	22	Lot 1	25.00	No Inventory.
142 N.	72 W.	34	NE1/4SE1/4	40.00	*70% water.
143 N.	72 W.	4	Lot 5	0.22	No Inventory.
143 N.	72 W.	6	Lot 3	22.00	No Inventory.

Kidder County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
143 N.	72 W.	28	Lot 3	2.48	No Inventory.
138 N.	73 W.	12	NW1/4NE1/4	40.00	Water.
138 N.	73 W.	12	SE1/4SE1/4	40.00	40% water.
138 N.	73 W.	14	S1/2N1/2	160.00	80% water.
143 N.	74 W.	4	Lot 1	27.40	No Inventory.
143 N.	74 W.	4	Lot 2	26.40	No Inventory.
144 N.	74 W.	12	Lot 4	0.67	No Inventory.

COUNTY: Logan

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
136 N.	68 W.	30	NW1/4NE1/4	40.00	*85% water.
134 N.	69 W.	14	NW1/4NW1/4	40.00	*95% water.
134 N.	69 W.	14	W1/2SW1/4	80.00	*100% water.
134 N.	69 W.	34	NW1/4NE1/4	40.00	*95% water.
134 N.	69 W.	34	NE1/4NW1/4	40.00	*95% water.
135 N.	69 W.	28	N1/2NE1/4	80.00	99% water.
135 N.	69 W.	32	NE1/4	160.00	95% water.
136 N.	69 W.	8	SW1/4NE1/4	40.00	85% water.
135 N.	70 W.	8	NE1/4SW1/4SW1/4SW1/4	2.50	85% water.

COUNTY: McHenry

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
152 N.	75 W.	2	Lot 2	47.64	Upland grassland.
153 N.	75 W.	3	Lot 6	18.70	Shoreline Long Lake.
153 N.	75 W.	25	NE1/4SW1/4	40.00	Upland grassland.
153 N.	75 W.	31	Lot 2	14.30	Shoreline.
153 N.	75 W.	31	Lot 4	15.40	Shoreline.
155 N.	75 W.	23	S1/2NW1/4	80.00	70% water.
155 N.	75 W.	23	NE1/4SW1/4	40.00	70% water.
155 N.	75 W.	23	NW1/4SE1/4	40.00	70% water.
155 N.	75 W.	33	NE1/4SW1/4	40.00	Upland grassland.
157 N.	75 W.	15	SW1/4SW1/4	40.00	Upland grassland.
155 N.	76 W.	10	NE1/4SW1/4	40.00	Upland grassland.
155 N.	76 W.	14	SE1/4NE1/4	40.00	Upland grassland.
155 N.	76 W.	23	N1/2NW1/4	80.00	Upland grassland.
155 N.	76 W.	23	SE1/4NW1/4	40.00	Upland grassland.
155 N.	76 W.	23	NE1/4SW1/4	40.00	Upland grassland.
155 N.	76 W.	23	NW1/4SE1/4	40.00	Upland grassland.
152 N.	77 W.	23	SW1/4NE1/4	40.00	98% upland.
153 N.	77 W.	23	SW1/4SE1/4	40.00	95% water.

McHenry County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
155 N.	77 W.	9	NW1/4SE1/4	40.00	Upland grassland.
156 N.	77 W.	15	NW1/4NE1/4	40.00	Upland grassland.
156 N.	77 W.	31	Lot 1	35.83	Upland grassland.
156 N.	77 W.	31	Lot 2	35.51	Upland grassland.
151 N.	78 W.	23	NE1/4SE1/4	40.00	80% water.
151 N.	78 W.	24	NW1/4NW1/4	40.00	90% water.
151 N.	78 W.	35	Lot 1	2.06	No Inventory.
152 N.	78 W.	15	SE1/4SW1/4	40.00	95% water.
152 N.	78 W.	15	SW1/4SE1/4	40.00	95% water.
152 N.	78 W.	22	N1/2NE1/4	80.00	95% water.
152 N.	78 W.	22	S1/2NE1/4	80.00	95% water.
152 N.	78 W.	22	NW1/4	160.00	95% water.
152 N.	78 W.	22	N1/2SE1/4	80.00	95% water.

COUNTY: McIntosh

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
129 N.	68 W.	12	NW1/4NE1/4	40.00	99% water.
130 N.	68 W.	24	SW1/4NE1/4	40.00	85% water.
130 N.	68 W.	24	NW1/4SE1/4	40.00	85% water.

McIntosh County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
130 N.	68 W.	24	Lot 6	39.80	85% water.
132 N.	68 W.	20	NE1/4NE1/4	40.00	100% water.
132 N.	72 W.	6	Lot 1	12.84	No Inventory.

COUNTY: McLean

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
150 N.	79 W.	26	SE1/4NW1/4	40.00	90% Upland grassland.
143 N.	81 W.	6	Lot 1	15.84	Missouri River riparian.
143 N.	81 W.	6	Lot 2	4.29	Missouri River riparian.
143 N.	81 W.	18	Lot 3	23.50	Missouri River riparian.
143 N.	81 W.	30	Lot 1	2.40	Missouri River riparian.
148 N.	81 W.	19	Lot 9	1.80	Wetlands.
144 N.	83 W.	30	Lot 4	42.10	Missouri River riparian.
144 N.	84 N.	8	Lot 1	20.60	Missouri River riparian.
144 N.	84 W.	8	Lot 2	25.60	Missouri River riparian.
144 N.	84 W.	8	Lot 3	17.80	Missouri River riparian.
145 N.	84 W.	34	Lot 3	15.60	Missouri River riparian.
145 N.	84 W.	34	Lot 4	15.00	Missouri River riparian.

McLean County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
146 N.	84 W.	32	Lot 1	25.58	Missouri River riparian.
146 N.	84 W.	32	Lot 4	26.22	Missouri River riparian.
146 N.	84 W.	32	Lot 5	33.13	Missouri River riparian.
146 N.	84 W.	32	Lot 8	9.74	Missouri River riparian.
149 N.	84 W.	11	E1/2SW1/4	80.00	99% water.
150 N.	84 W.	27	NW1/4SE1/4	40.00	80% water.
150 N.	85 W.	1	Lot 1	0.20	No Inventory.
150 N.	86 W.	21	NE1/4SE1/4	40.00	90% water.
150 N.	86 W.	22	S1/2NW1/4	80.00	90% water.
150 N.	86 W.	22	NW1/4SW1/4	40.00	90% water.

COUNTY: Mountrail

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
155 N.	88 W.	20	Lot 4	6.87	No Inventory.
156 N.	88 W.	17	SW1/4NE1/4	40.00	*25% water.
156 N.	89 W.	3	SE1/4NW1/4	40.00	*90% upland.
157 N.	89 W.	29	Lot 1	16.80	*Recommended for HEP.
157 N.	89 W.	32	Lot 1	1.10	No Inventory.
156 N.	90 W.	20	SE1/4SW1/4	40.00	*95% water.

Mountrail County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
156 N.	90 W.	20	SW1/4SE1/4	40.00	95 % water.
158 N.	90 W.	18	SE1/4NE1/4	40.00	*Recommended for HEP.
152 N.	90 W.	5	SW1/4SE1/4	40.00	*Upland.
153 N.	90 W.	20	NE1/4NE1/4	40.00	*Upland.
155 N.	91 W.	5	Lot 3	39.83	*Upland.
156 N.	91 W.	5	Lot 4	60.55	*80% water.
156 N.	91 W.	13	W1/2NE1/4	80.00	*90% water.
157 N.	91 W.	34	Lot 2	17.30	No Inventory.
154 N.	92 W.	31	Lot 1	38.85	*Upland.
153 N.	93 W.	13	SE1/4SW1/4	40.00	*Upland.
153 N.	93 W.	26	SE1/4NE1/4	40.00	*Upland.
153 N.	93 W.	26	NE1/4SE1/4	40.00	*Upland.
154 N.	94 W.	25	NW1/4SW1/4	40.00	*Upland.
155 N.	94 W.	15	SW1/4NE1/4	40.00	*Upland.
155 N.	94 W.	35	SW1/4NW1/4	40.00	*Upland.

COUNTY: Pierce

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
157 N.	72 W.	23	Lot 5	0.32	No Inventory.
152 N.	73 W.	5	Lot 10	0.15	No Inventory.
152 N.	74 W.	8	Lot 1	4.57	No Inventory.
152 N.	74 W.	8	Lot 5	24.50	*75% water.
152 N.	74 W.	8	Lot 6	16.80	*75% water.
154 N.	74 W.	30	NE1/4SW1/4	40.00	*98% water.

COUNTY: Renville

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
158 N.	86 W.	30	Lot 2	38.31	*Woody draw.
158 N.	86 W.	33	SW1/4NW1/4	40.00	*Woody draw.

COUNTY: Sheridan

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
145 N.	74 W.	26	SE1/4NE1/4	40.00	*40% water.
145 N.	74 W.	26	NE1/4SE1/4	40.00	*40% water.
150 N.	75 W.	14	S1/2NW1/4	80.00	* Water
149 N.	77 W.	2	Lot 7	13.40	No Inventory.

Sheridan County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
150 N.	77 W.	13	Lot 1	17.70	No Inventory.
150 N.	77 W.	17	SW1/4SW1/4	40.00	*70% water.
150 N.	77 W.	20	Lot 1	11.40	No Inventory.
150 N.	77 W.	20	Lot 2	9.50	No Inventory.
150 N.	77 W.	28	Lot 2	32.30	No Inventory.
150 N.	77 W.	35	Lot 2	13.70	No Inventory.
147 N.	78 W.	1	Lot 3	40.20	Upland.

COUNTY: Stutsman

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
138 N.	67 W.	8	NE1/4NW1/4	40.00	*98% water.
138 N.	68 W.	10	SW1/4SE1/4	40.00	*99% water.

COUNTY: Towner

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
163 N.	65 W.	5	Lot 3	13.50	No Inventory.

COUNTY: Walsh

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
157 N.	50 W.	8	Lot 1	10.94	No Inventory

COUNTY: Ward

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
151 N.	84 W.	29	NE1/4SW1/4	40.00	*99% water.
153 N.	86 W.	4	Lot 4	0.93	No Inventory.
153 N.	86 W.	5	Lot 1	22.20	No Inventory.
153 N.	86 W.	5	Lot 5	25.60	No Inventory.
153 N.	86 W.	7	Lot 2	0.37	No Inventory.
152 N.	87 W.	1	Lot 6	16.50	No Inventory.
152 N.	87 W.	4	SE1/4SW1/4	40.00	*90% water.
152 N.	87 W.	9	NE1/4NW1/4	40.00	*90% water.
155 N.	87 W.	8	NW1/4SW1/4	40.00	*98% upland.
159 N.	87 W.	32	NE1/4SW1/4	40.00	*Upland.

COUNTY: Williams

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
154 N.	95 W.	7	Lot 2	36.81	
154 N.	95 W.	7	Lot 3	36.87	
154 N.	95 W.	7	Lot 4	36.93	
154 N.	95 W.	28	SE1/4NW1/4	40.00	
154 N.	96 W.	12	SE1/4NE1/4	40.00	

Williams County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
154 N.	96 W.	12	NE1/4SE1/4	40.00	
154 N.	97 W.	17	SW1/4NE1/4	40.00	
155 N.	97 W.	21	SE1/4SE1/4	40.00	
153 N.	99 W.	28	NW1/4NE1/4	40.00	
153 N.	99 W.	28	NW1/4NW1/4	40.00	
154 N.	100 W.	33	SE1/4SE1/4	40.00	
154 N.	101 W.	29	SW1/4SE1/4	10.00	
152 N.	103 W.	20	Lot 1	37.00	
152 N.	103 W.	20	Lot 3	14.00	
152 N.	103 W.	21	Lot 5	22.00	
153 N.	103 W.	26	SW1/4NW1/4	40.00	
153 N.	103 W.	26	NE1/4SW1/4	40.00	
153 N.	103 W.	27	NE1/4SW1/4	40.00	
152 N.	104 W.	5	SW1/4SW1/4, portions of	30.27	
152 N.	104 W.	14	Lot 1	40.30	
152 N.	104 W	14	Lot 2	27.00	
152 N.	104 W.	14	Lot 3	20.90	

Williams County Continued:

T.	R.	SEC.	SUBDIVISION	ACREAGE	COMMENTS
152 N.	104 W.	15	Lot 1	14.75	
152 N.	104 W.	15	Lot 2	16.10	
153 N.	104 W.	10	Lot 1	29.91	
152 N.	104 W.	20	Lot 4	8.10	
152 N.	104 W.	21	Lot 4	11.00	
152 N.	104 W.	23	Lot 1	3.31	
152 N.	104 W.	24	Lot 2	11.80	
152 N.	104 W.	24	Lot 3	34.25	

*Source: Bureau/Rec. Inventory 1983

APPENDIX I

METHODOLOGY USED TO CALCULATE WATERSHED IMPACTS

The effects of grazing on sediment and water yields depend upon the grazing duration, intensity and season of use, as well as soil, climate, vegetation and topography interactions. Because of the complexity of these interactions, only generalizations are possible. Some of the figures for sediment and water yield appear as exact numbers, but are actually estimates.

The figures for sediment yields were derived from data taken in a reservoir sediment survey. Most of the data was collected in eastern Montana but in similar hydrologic geomorphic conditions as occurs on most of the North Dakota public lands.

Sediment yield ranges were produced for each hydrologic geomorphic area. It is assumed the low end of the range represents a watershed in good to excellent condition; the middle of the range, a watershed in fair to good condition; while the high end of the range represents a watershed in poor condition.

Initial or existing sediment yields were estimated using the sediment yield ranges and range condition mapping. The effects of each alternative were projected by estimating how far along the sediment yield range line an area would move as a result of the action being considered.

For example, an area presently in poor range condition that could be brought into good to excellent condition by a particular alternative would move from a sediment yield at the high end of the range to a sediment yield at the low end. Superimposed over this was consideration of the size and location of the public land tract in relation to the local stream network. In many cases the tracts were considered too small and isolated for grazing practices on the public land to have much of an influence on local streamflow conditions.

Water yields were also estimated using data collected in eastern Montana. It was assumed that water yields varied directly with sediment yields. Therefore, the same method used to predict sediment yields was used to predict water yields.

APPENDIX J

RESERVOIR SEDIMENT SURVEY

Reservoir Name	Location Twp-Rng.-Sec	Date Constructed MO/YR	Age in Years	Designed Water Storage Capacity (ac-ft)	Existing Sediment Volume in Reservoir	Existing Water Storage Capacity (ac-ft)	% Sediment Trapped	Date Surveyed MO/DAY/YR	Soil Subgroup	Hydrologic Geomorphic Area	Reservoir Sediment Yield (ac-ft/mi^2/yr)	Average Annual Water Yield (ac-ft/mi^2/yr)
MONTANA												
Barley	8N 43E 10	4/47	33	7.74	4.09	3.65	98	07/22/80	3	I	0.69	5.91
Brackett	16N 39E 3	/39	41	8.65	2.55	6.08	98	06/15/80	3	I	0.24	8.20
Bradac	6N 60E 12	9/58	22	1.20	0.95	0.25	64	09/12/80	5	IV	0.21	10.54
Chickle	15N 46E 12	9/36	44	8.92	1.44	7.48	72	08/19/80	3	I	0.07	15.73
Cornwell	6N 39E 2	3/47	33	4.70	1.37	3.33	98	06/26/80	5	IV	0.26	9.96
Don's	12N 37E 30	7/53	27	16.10	7.30	8.80	98	07/11/80	3	I	1.18	11.90
Gray	9N 54E 20	/52	28	5.61	2.28	3.33	97	08/22/80	4	III	0.31	13.24
Haughian	11N 49E 2	/53	27	8.50	4.92	3.58	98	08/07/80	1	III	2.02	4.40
Keltner	13N 49E 2	/36	44	2.48	1.86	0.62	98	07/31/80	3	I	0.25	5.53
Lark	14N 55E 15	/68	13	2.86	0.57	2.29	93	06/25/81	6	IV	0.15	18.58
Lockie	7N 44E 4	7/44	36	5.92	1.09	4.83	98	06/30/80	3	I	0.34	2.80
MacKenzie	5N 53E 30	/51	29	2.90	0.44	2.46	98	08/21/80	6	IV	0.19	5.23
Shaw	14N 31E 10	/71	9	29.05	3.95	25.10	98	06/17/80	5	IV	3.13	7.00
Woodruff	7N 53E 7	/50	30	0.76	0.33	0.43	89	08/12/80	4	III	.16	3.53
NORTH DAKOTA												
Cedar Draw	130N 106W 19	/52	30	5.3	2.0	3.3	75	07/82	5	IV	0.71	
Dead Sheep	131N 107W 23	7/67	15	13.0	2.0	11.0	98	07/82	6	IV	0.50	
Gilmore	131N 107W 23	/66	16	13.6	2.1	11.5	98	07/82	6	IV	0.84	

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GLOSSARY

ALLOTMENT. An area of land where one or more individuals graze their livestock. It generally consists of BLM lands but may include parcels of private or state-owned lands. The number of livestock and season(s) of use are stipulated for each allotment. An allotment may consist of several pastures or may be only one pasture.

AMP. Allotment Management Plan. A concisely written program of livestock grazing management, including supportive measures if required, designed to attain specific management goals in a grazing allotment. It is prepared with consultation, cooperation, and coordination with the permittee(s), lessee(s), or other affected parties.

ANIMAL UNIT. A standardized unit of measurement for range livestock which is equivalent to one cow or one horse or five sheep, all over six months of age.

AUM. Animal Unit Month. The amount of forage necessary for the complete sustenance of one cow, or its equivalent (one horse or five sheep, all over six months old) for one month; also, a unit of measurement of grazing privilege that represents the privilege of grazing one animal for a period of one month.

BIOLOGICAL CONTROL. Control of pests by means of living organisms like predators, parasites, and disease-producing organisms.

CHANGING SEASON OF USE. Adjusting the time livestock grazing is permitted on a range area on the basis of type of vegetation or state of vegetative growth.

CLIMAX VEGETATION. The final vegetative community that emerges after a series of successive vegetational stages and perpetuates itself indefinitely unless disturbed by outside forces.

COMPACTION. The process of packing firmly and closely together; the state of being so packed, e.g., mechanical compaction of soil by livestock or vehicular activity. Soil compaction results from particles being pressed together so that the volume of the soil is reduced. It is influenced by the physical properties of the soil, moisture content and the type and amount of compactive effort.

COW-CALF OPERATION. A livestock operation in which a basic breeding herd of cows, heifers and bulls is maintained. The cows produce a calf crop each year and the operation keeps some heifer calves from each crop for breeding herd replacements. The operation sells the rest of the calf crop between the ages of 6-12 months along with old or non-productive cows and bulls.

CRUCIAL WILDLIFE HABITAT. Parts of the habitat necessary to sustain a wildlife population at critical periods of its life cycle. This is often a limiting factor on the population, such as breeding habitat, winter habitat, etc.

CULTURAL RESOURCES. A term that includes resources of historical, archaeologicl, or architectural significance, which are fragile, limited, and nonrenewable portions of the human environment.

CULTURAL SITE. Any location that includes prehistoric and/or historic evidence of human use.

CURRENT YEAR'S GROWTH. The amount of vegetative growth that occurs in the period of one year.

CUSTODIAL MANAGEMENT. Minor degree of management effort applied to regulating livestock use on a range area. Generally, custodial management involves situations where the public land is a small part of the total grazing area and/or other resources are limited. Usually only livestock numbers, kind of animal, and grazing season are specified by the BLM.

DECREASER PLANT. A plant species of the original vegetation that will decrease in relative abundance with continued overuse.

DEFERRED GRAZING. The discontinuance of livestock grazing on an area for a specified period of time during the growing season to promote plant reproduction, establishment of new plants, or restoration of vigor by old plants.

DISTRIBUTION. The uniformity of livestock grazing use over a range area. It is affected by water availability, topography, and type and palatability of vegetation.

ENVIRONMENTAL IMPACT STATEMENT (EIS). A written analysis of the impacts of a proposed project (e.g., grazing program) on the environment.

EROSION SUSCEPTIBILITY. The susceptibility of a soil to erosion when no cover is present. The rate of soil displacement depends on the physical properties of the soil, rainfall intensity and slope gradient.

FORAGE. Vegetation of all forms available for animal consumption.

GRAZING SYSTEM. The manipulation of livestock grazing to accomplish a desired result.

GROUND COVER. Vegetation, mulch, litter, rock, etc.

GROUNDWATER. Water contained in pore spaces of consolidated and unconsolidated surface material.

HABITAT. A specific set of physical conditions that surround the single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

HABITAT REQUIREMENTS. Those items that an animal or plant requires for proper life cycles and growth. See also "Limiting Factor."

HYDROLOGIC SOIL GROUP. A class of soils that have similar general infiltration and water movement ability through the soil profile and bedrock. Hydrologic groups are used to estimate runoff after rainfall. Soil properties that influence infiltration rates and runoff are depth to a water table, water intake rate and permeability, and depth to layers of slowly permeable soil.

INTERSEEDING. The practice of seeding native or introduced plant species into native range in combination with various mechanical treatments. Interseeding differs from range seeding in that only part of the native vegetation is removed to provide a seedbed for the seeded species.

LITTER. The uppermost layer of organic debris. It is composed of freshly fallen or slightly decomposed organic materials.

LIVESTOCK OPERATION. The management of an area of land so that a significant portion of the income is derived from the continuing production of livestock.

LIVESTOCK OPERATOR. A person who operates a livestock business.

NOXIOUS PLANT. An undesirable plant species that may render land unfit for use, damage livestock or wildlife, or be injurious to humans. Used in this document to describe plants declared noxious by state and county laws.

PERENNIAL (PERMANENT STREAM). A stream which flows 9 or more months out of a year.

PLANT VIGOR. The relative well-being and health of a plant as reflected by its ability to manufacture sufficient food for growth and maintenance.

RANGE CONDITION CLASS (ecologic). One of a series of arbitrary categories used to classify range condition, usually expressed as either excellent, good, fair, or poor in this report. The four classes express the percentage of the present plant community that is climax for the range site as follows: excellent, 76 to 100 percent; good, 51 to 75 percent; fair, 26 to 50 percent; and poor 0 to 25 percent.

RANGE DEVELOPMENT. A structure, development, or treatment used to rehabilitate, protect, or improve the public lands to advance range betterment.

RANGE SITE. A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. A range site is the product of all the environmental factors responsible for its development. It is capable of supporting a native plant community typified by an association of species.

RANGE TREND. The change in vegetation and soil characteristics as a direct result of environmental factors, primarily climate and grazing. Studies in range trend are used in combination with other studies to evaluate allotment management plans and grazing systems. Trend data are collected on key areas and rely on key species to represent the pasture or allotment. A trend index is used in evaluating trend data. This index is computed by adding the following factors: composition of key species, total cover of key species, number of seedlings of key species, and percentage of litter in the entire plot. Any change in range trend is reflected by a corresponding rise or decline in the trend index.

RIPARIAN. Situated on or pertaining to the bank of a river, stream, or other body of water. Normally used to refer to the plants of all types that grow along streams, around springs, etc.

STAGNATION. The reduction in productivity of range plants that results from a lack of grazing.

STOCKING RATE. The degree to which a grazing unit is stocked with livestock, usually expressed in AUMs.

SUCCESSION. The progressive development of the vegetation towards its highest ecological expression (climax).

SURFACE WATER. Water standing on or moving across the land surface; includes streamflow, runoff, and ponded water.

WATER QUALITY. The chemical, physical and biological characteristics of water with respect to its suitability for a particular use.

WATERSHED. All lands which are enclosed by a continuous hydrologic drainage divide and lie upslope from a specified point on a stream.

WETLANDS. Permanently wet or intermittently flooded areas where the water table (fresh, saline or brackish) is at, near or above the soil surface for extended intervals, where hydric wet soil conditions are normally exhibited and where water depths generally do not exceed two meters.

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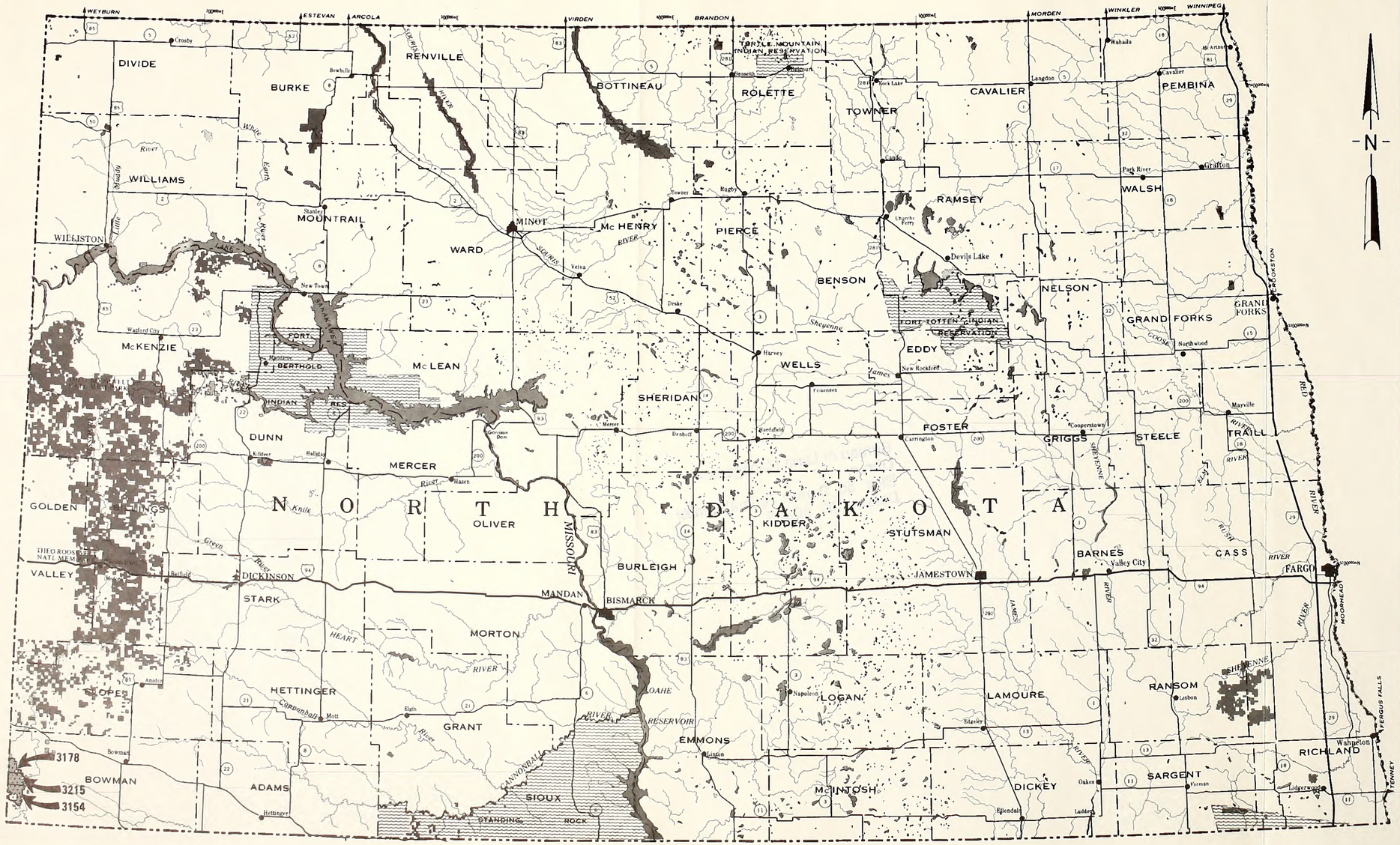

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BUREAU OF LAND MANAGEMENT
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LIVESTOCK GRAZING EIS

BLM LIVESTOCK GRAZING USE NORTH DAKOTA

LEGEND

- Public Lands (BLM)
- Other Federal Lands
- Indian Lands
- Allotment Management Plans

SOURCE: BLM, 1984